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COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

TRANSMITTING

A REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, ON MOBILE HARBOR, ALABAMA, TOGETHER WITH OTHER PERTINENT REPORTS. THE REPORT HAS BEEN PREPARED IN RESPONSE TO A RESOLUTION ADOPTED JUNE 24, 1965, BY THE COMMITTEE ON PUBLIC WORKS, HOUSE OF REPRESENTATIVES

JULY 14, 1986.—Referred to the Committee on Public Works and Transportation and ordered to be printed with illustrations

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U.S. GOVERNMENT PRINTING OFFICE
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LETTER OF TRANSMITTAL

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103

12 JUN 1986

Honorable Thomas P. O'Neill, Jr.
Speaker of the House of Representatives
Washington, D. C. 20515

Dear Mr. Speaker:

I am transmitting a report dated November 18, 1981, from the Chief of Engineers, Department of the Army, on Mobile Harbor, Alabama, together with other pertinent reports. These reports have been prepared in response to a resolution adopted June 24, 1965, by the Committee on Public Works of the U.S. House of Representatives.

The views of the State of Alabama; the Department of the Interior; the Department of Transportation; the Department of Commerce; the Department of Agriculture; and the Environmental Protection Agency are set forth in the enclosed communications, together with pertinent replies.

With the exception of cost sharing, we concur with modification of the existing deep draft harbor project as recommended by the Chief of Engineers. Recommendations for cost sharing in the report of the Chief of Engineers are in accord with generic cost-sharing legislation we proposed to the Congress in July 1981. Since that legislation was not enacted, we recommend, and the Administration supports, authorization of this project for construction in a single stage or in usable increments and such authorization be contingent upon passage of navigation cost-sharing and user-fee legislation consistent with Administration policy.

The Office of Management and Budget advises that there is no objection to the submission of this report to the Congress. A copy of its letter is enclosed.

Sincerely,

Robert K. Dawson
Assistant Secretary of the Army
(Civil Works)

Enclosure

COMMENTS OF THE OFFICE OF MANAGEMENT AND BUDGET

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

May 7, 1986

Honorable Robert K. Dawson
Assistant Secretary of the
Army for Civil Works
Room 2E570 - Pentagon
Washington, D.C. 20310

Dear Mr. Dawson:

We have completed our review of the report, and your recommendations on Mobile Harbor, Alabama, as required under Executive Order 12322.

The Office of Management and Budget does not object to your submitting this report to Congress. The Administration supports authorization of this project for construction in accordance with your recommendations, contingent upon passage of navigation cost-sharing and user-fee legislation consistent with Administration policy.

Sincerely,

Randall E. Davis
Associate Director
for Natural Resources,
Energy and Science

COMMENTS OF THE GOVERNOR OF ALABAMA

STATE OF ALABAMA
GOVERNOR'S OFFICE
MONTGOMERY 36130

FOB JAMES
GOVERNOR

June 30, 1981

Colonel Forrest T. Gay, III
Executive Director, Engineering Staff
U. S. Army Corps of Engineers
Office of the Chief of Engineers
Washington, D. C. 20314

RE: DAEN-CWP-A

Dear Colonel Gay:

We have reviewed the proposed report of the Chief of Engineers on Mobile Harbor, Alabama which was provided by your letter of April 21, 1981.

I am most pleased the proposed report of the Chief of Engineers recommends the existing project for Mobile Harbor, Alabama, be modified to provide deep-draft navigation improvements generally in accordance with the plan developed by the District Engineer and described as the Brookley Expansion Area and Gulf Disposal Plan No. 1 (modified). This is the alternative plan I had suggested earlier and which I still fully support. However, I have several concerns about the non-Federal cost recommendation including the proposed cost-sharing policy for vendible and non-vendible projects; the share of project costs allocated to land enhancement; and, the costs associated with fish and wildlife mitigation measures.

I stand by my earlier position (letter of October 27, 1980 to the District Engineer) regarding the cost sharing for vendible and non-vendible pojects. Until such time as Congress clarifies the cost-sharing issue, the Mobile Harbor improvement project should move forward under the current laws of the Nation. The new cost-sharing proposal does not properly recognize the cost-sharing currently in existence as the "non-Federal" part of the major water projects. On this project, for example, the majority of the non-Federal cost will be the responsibility of the State of Alabama.

We are putting State dollars out front. On February 1 of this year, the Alabama State Docks Department sold a $100 million "Coal Export and Port Facilities Expansion Revenue Bond Issue" to fund expansion of its coal and grain export facilities at Mobile. Construction of the expanded coal export facilities is underway, and is being designed and constructed to accommodate ships of the size that will require a channel depth of 55 feet. Also, plans have begun for expansion of the State's import facilities to be located on the proposed 55-foot channel. We look forward to working with the Corps of Engineers and others to see the approval of the Mobile Harbor improvements including the 55-foot channel.

I note that the recommended plan which includes the Brookley Expansion Area would provide for disposal of material dredged from the upper harbor at a considerable savings compared to the cost of disposing of this material in the Gulf of Mexico. The Chief's proposed report estimated the cost savings in the order of $100 million due to the higher dredging and haulage costs involved with total Gulf disposal. While the State of Alabama would certainly benefit from the creation of the Brookley Expansion Area, the $100 million savings to the Federal Government should in some way be reflected in the cost-sharing for land enhancement.

It is my opinion the significant investment which will be required by the State to make the Brookley Expansion Area suitable for development and use should be considered in the cost-sharing allocation, along with the savings to the Federal Government over other alternatives.

Finally, we recognize Federal law requires the Chief of Engineers to consider the losses to fish and wildlife resources which could result from proposed projects. I, too, am concerned that all environmental impacts be carefully considered when making a decision. The issue in this case is the need for mitigation of the loss of wetlands and bay bottoms. I am not convinced the mitigation measures the Corps has recommended are needed or justified. I would prefer that these items be further studied and not included in the plan of improvement to be considered for authorization at this time.

Again, I would like to make my position clear. I, as Governor of the State of Alabama, completely endorse this project as proposed in the Chief of Engineers' report with the exception of the proposed cost-sharing of non-vendible projects, the land enhancement costs issue, and the recommended mitigation measures.

I trust that my views will be given full consideration by the Administration and Congress as this worthwhile project proceeds through the authorization process.

Sincerely,

Fob James

FJ/jt

cc: Bob Davis
Walter Stevenson
Bob Hope

LETTER TO THE GOVERNOR OF ALABAMA

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:

DAEN-CWP-A

18 November 1981

Honorable Forrest James, Jr.
Governor of Alabama
State Capitol
Montgomery, Alabama 36104

Dear Governor James:

This is in reply to your recent letter concerning cost-sharing policies contained in my proposed report on Mobile Harbor, Alabama.

I am furnishing you a copy of my final report on Mobile Harbor, Alabama. My recommendations for implementation of this project have been modified in accordance with the Administration's July 15, 1981 proposed legislation which provides for full recovery of certain operations, maintenance and construction or rehabilitation costs for deep draft navigation channels and ports.

The purpose and provisions of the proposed legislation are discussed in my report. I have recommended that prior to implementation of the Mobile Harbor project local interests agree to reimburse the Federal government for construction of the navigation features of the project, and all subsequent expenditures for operation, maintenance and rehabilitation; except for expenditures assigned by the Secretary of the Army to governmental vessels in non-commercial service. This proposal to fully recover costs supersedes the previous requirement for a 5 percent state cash contribution.

Your letter, together with a copy of this reply, will be included with the report when it is submitted to the Congress.

Sincerely,

J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

1 Incl
Chief's Report

CF: Robert M. Hope
Director
Alabama State Docks Department
P.O. Box 1588
Mobile, Alabama 36601

COMMENTS OF THE DEPARTMENT OF THE INTERIOR

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER-81/742

July 17, 1981

Lieutenant General J. K. Bratton
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Bratton:

The Department of the Interior has reviewed the Chief of Engineers' proposed report, final environmental statement, and other pertinent reports on Mobile Harbor, Alabama. We request that you consider the following comments on the Chief of Engineers' report.

Our review of the Chief's report reveals that the recommended plan for the Mobile Harbor Project, Brookley Expansion and Gulf Disposal Plan I (Modified) will result in extensive fish and wildlife damages. The fish and wildlife values of the project area, as well as recommendations for reducing expected adverse impacts, have been presented in the Fish and Wildlife Coordination Act (FWCA) report, dated May 20, 1980. Our Fish and Wildlife Service (FWS) expressed opposition to the project filling of 1,700 acres of bay bottom and 70 acres of marsh and favored the Gulf Disposal Plan which is significantly less damaging to fish and wildlife resources. In addition, FWS also recommended that studies be conducted to determine the feasibility of using other areas for port expansion in lieu of filling productive bay bottoms and marshes. Hundreds of acres of diked spoil sites in the harbor area, as well as the Theodore Industrial Park, could provide future port facilities. Maximum use of these areas would eliminate the severe fish and wildlife impacts which would result from filling of the bay.

As indicated in the 1980 FWCA report, the shallow water bottoms, grassbeds, and tidal marshes within Mobile Bay provide vital spawning and nursery habitat for a major portion of the marine and freshwater finfish and shellfish that inhabit the Alabama Coastal Zone. Marshes and forested wetlands within the Mobile Delta are extensively used by fish and wildlife and are important wintering waterfowl areas. Mobile Bay also supports an important commercial finfish and shellfish fishery which includes such species as the Atlantic croaker, spotted seatrout, shrimp, blue crab and oyster.

The magnitude of fish and wildlife damages occurring in Mobile Bay are placed in better perspective when reviewed accumulatively. Since the Federal project in Mobile Bay began, the disposal of dredged material has destroyed nearly 1,800 acres of productive wetland habitat in the upper bay area. Over 1,300 acres of bay bottom are currently being filled in association with the Theodore Industrial Channel. Channel construction alone has eliminated approximately 1,500 acres of bay bottom. Over 20,000 acres of the bay are being used for disposal of maintenance material from the bay navigation channel. Plans are also being considered to use approximately 180 acres of prime wetland in Pinto Pass for disposal of dredged material from the Mobile River. Extensive development is being projected for this area in association with the Mobile Harbor and Tenn-Tom Waterway projects which could result in substantial reduction of fish and wildlife resources. An additional loss of 1,700 acres of bay bottom and 70 acres of marsh would significantly magnify the continuous degradation of Mobile Bay.

We acknowledge the proposed mitigation measures presented (Chief's report, page 3, paragraphs 5 and 6) which include creation of 70 acres of marsh and improving water circulation where applicable. However, we do not believe that these mitigation proposals would adequately offset fish and wildlife damages resulting from the elimination of 1,700 acres of bay bottom and 70 acres of marsh.

If the Mobile Harbor project is authorized and constructed as proposed, severe fish and wildlife damages would occur. We therefore urge the Chief of Engineers to provide for deep gulf disposal. If the project is ultimately authorized without inclusion of the deep gulf disposal option, then the authorization should provide for continuing efforts to formulate means and measures to address future project mitigation needs. This suggestion is necessitated by the fact that studies to date have not revealed ways to effectively mitigate impacts.

Considering the extensive development presently occurring and that proposed for Mobile Bay, we believe that development of a comprehensive resource use plan for the bay area would be appropriate. We understand that the State of Alabama may be interested in the implementation of the special area management planning process for Mobile Bay. In the event that such planning is initiated, we urge that project authorization provide for consideration of recommendations resulting from the special area management plan in the future stages of project planning.

Thank you for the opportunity to comment on these reports.

Sincerely,

Acting
Deputy Assistant SECRETARY

LETTER TO THE SECRETARY OF THE INTERIOR

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:
DAEN-CWP-A

18 November 1981

Honorable James G. Watt
Secretary of the Interior
Washington, D. C. 20240

Dear Mr. Secretary:

This is in reply to the recent letter from the Acting Deputy Assistant to the Secretary commenting on my proposed report on Mobile Harbor, Alabama.

We are aware of your concerns regarding the fish and wildlife resources in Mobile Bay. I agree that the project for Mobile Harbor, as proposed, will remove shallow water habitat and therefore, impact the Mobile Bay ecosystem. We have carefully considered the impacts along with economic benefits to be gained by utilizing the new work dredged material in the upper bay as a resource to provide regional economic benefits for land enhancement. The only other disposal sites that would be acceptable to environmental interests are the deep water sites in the Gulf of Mexico. Elimination of the Brookley disposal area from the plan would cost an additional $100 million and result in economic opportunities foregone due to land enhancement estimated to be about $3,000,000 annually. It is our view that environmental mitigation measures can be identified to provide an effective way to mitigate for loss of resource values and ecological damages due to establishment of the Brookley disposal area.

Our future studies of the proposed channel deepening and related mitigation measures will be closely coordinated with the U.S. Fish and Wildlife Service and the State of Alabama Coastal Area Management Board. I support the State's interest in preparing a comprehensive resource use plan for Mobile Bay. Such a plan would certainly aid in planning the area's water related development.

The letter from the Acting Deputy Assistant to the Secretary, together with a copy of this reply will be included with the report when it is submitted to the Congress.

Sincerely,

J K Bratton

J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

COMMENTS OF THE DEPARTMENT OF AGRICULTURE

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

July 20, 1981

Lieutenant General J. K. Bratton
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Bratton:

We have reviewed the Survey Report on Mobile Harbor, Alabama, together with a final environmental impact statement and other pertinent reports. According to these reports, the recommendation is to deepen and widen existing channels to accommodate vessels transporting coal and iron ore. The proposed project has a first cost of $313 million (revised) and a benefit to cost ratio of 1:6. The Board's recommendations and requirements seem reasonable.

We have no other comments regarding subject reports.

Sincerely,

John R Block

John R. Block

COMMENTS OF THE DEPARTMENT OF TRANSPORTATION

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS: G-WP/11
U.S. COAST GUARD
WASHINGTON, DC 20593
PHONE:
202 426-2262

July 30, 1981

Lieutenant General J. K. Bratton
Chief of Engineers
Department of the Army
Washington, D.C. 20314
Attn: DAEN-CWP

Dear General Bratton:

This is in response to Colonel Gay's letter of April 21, 1981, concerning the proposed report and Final Environmental Impact Statement on the Mobile Harbor, Alabama.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. We have no comments to make nor do we have any objections to this proposed project.

The opportunity to review the report is appreciated.

Sincerely,

W. E. Caldwell

W. E. CALDWELL
Rear Admiral, U. S. Coast Guard
Chief, Office of Marine
Environment and Systems

COMMENTS OF THE DEPARTMENT OF COMMERCE

GENERAL COUNSEL OF THE
UNITED STATES DEPARTMENT OF COMMERCE
Washington, D.C. 20230

July 10, 1981

Lieutenant General J. K. Bratton
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Bratton:

Enclosed are comments from the Maritime Administration, Office of Port and Intermodal Development on Mobile Harbor, Alabama.

Thank you for the opportunity to review this report.

Sincerely,

Robert T. Miki

Robert T. Miki
Director of Regulatory Policy

Enclosure

The Office of Port and Intermodal Development concurs with the findings and recommendations set forth in the Survey Report on Mobile Harbor, Alabama. From the information given, it appears that the selected alternative adequately coordinates the concerns of everyone involved, and satisfies criteria for national economic development and environmental quality.

Our interest is the specific planning objectives by which the Mobile Harbor can efficiently and safely accommodate larger vessels desiring to call at the port, in light of increased commodity flows, i.e., coal and grains. The selected alternative does satisfy the impending requirement.

Finally, this Office feels, however, that further consideration should have been given to direct transportation savings as a result of the selected alternative. Such consideration would provide a more complete profile of the economic benefits that would be derived.

John M. Pisani, Director
Office of Port & Intermodal Development
Maritime Administration
July 1, 1981

COMMENTS OF THE DEPARTMENT OF COMMERCE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Washington, D.C. 20235

F/HP:JH
F/SER613:MT

June 12, 1981

General Joseph K. Bratton
Chief of Engineers
Attn: DAEN-CWP
Department of the Army
Washington, D.C. 20314

Dear General Bratton:

This is in reference to the transmittal notice, dated May 12, 1981, from Colonel Forrest T. Gay, III, Executive Director, Engineer Staff regarding the Final Environmental Impact Statement (FEIS) on the Mobile Harbor, Alabama, project filed with the Environmental Protection Agency.

Numerous attempts have been made by the National Marine Fisheries Service and other agencies to dissuade the Corps of Engineers from recommending filling 1,710 acres of bay bottom and vegetated wetlands at the Brookley Site 1/ 2/ 3/. It is our opinion that the proposed elimination of habitat is not justifiable and that mitigation measures described in the FEIS will not compensate for the substantial losses involved. We have grave concerns regarding the continual filling of Mobile Bay for land creation and the resulting large-scale elimination of fishery habitat in this estuary.

To date, literally thousands of acres of marsh and shallow-water habitat have been eliminated from this estuarine ecosystem by filling and disposal of dredged materials. Thousands of acres of bay bottom have been dredged. Approximately 20,000 acres of open bay annually receive deposits of dredged material from channel maintenance dredging. Currently, 1,300 acres of the bay are being filled at Theodore Ship Channel and plans are being made to fill 180 acres of vegetated wetlands at Pinto Pass, in addition to the 70 acres of vegetated and 1,640 acres of shallow-water habitat at Brookley. This totals nearly five square miles of fisheries habitat that would be permanently removed by the Federal government within this decade.

1/ Letter dated January 16, 1981, from Assistant Administrator for Fisheries to Chairman, Board of Engineers for Rivers and Harbors.

2/ Letter dated February 13, 1980, from NMFS' Southeast Regional Director to District Engineer, Mobile.

3/ Memorandum dated August 17, 1979, submitting NMFS' comments on the Draft Environmental Impact Statement-Technical Report on Mobile Harbor, Alabama.

As earlier recommended, we believe the preferable alternative to filling at Brookley is disposal of all dredged material at sites in the Gulf of Mexico (the Gulf Disposal Plan). The FEIS states that this plan has a favorable benefit-cost ratio and it is considerably more acceptable environmentally. We further believe that it has not been demonstrated that sufficient industrial expansion sites do not presently exist along the western shore of Mobile Bay. Thus, we cannot concur that there is a need for additional fill areas for that purpose.

In summary, we are gravely concerned about the continued destruction of fishery habitat in Mobile Bay and, considering its past history and the present proposals, we do not see an end to it. Therefore, we request that you recommend to Congress that the Gulf Disposal Plan be adopted rather than the Brookley Expansion Plan. I am available to consult with you should this be helpful.

Sincerely yours,

William H. Stevenson

for Terry L. Leitzell
Assistant Administrator
for Fisheries

cc: Deputy Assistant Secretary of the Army (Civil Works)
Chairman, President's Council on Environmental Quality

LETTER TO THE SECRETARY OF COMMERCE

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO ATTENTION OF: DAEN-CWP-A

18 November 1981

Honorable Malcolm Baldrige
Secretary of Commerce
Washington, D. C. 20230

Dear Mr. Secretary:

This is in reply to the recent letter from the Assistant Administrator for Fisheries, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, concerning my proposed report on Mobile Harbor, Alabama.

We are aware of the opposition to the Brookley Disposal Area by the U.S. Fish and Wildlife Service, Environmental Protection Agency, National Marine Fisheries Service, and various local citizens and environmental interests. Opposition is based on the belief that this project feature would adversely impact wetlands which fringe the project area, commercial and recreational fisheries, esthetic values, and existing land uses along the Brookley waterfront.

The considered Gulf Disposal Plan No. 1, which would avoid these adverse impacts by placing all dredged material from construction in the Gulf of Mexico, is the alternative preferred by many environmental interests. Because of the controversial nature of the Brookley Dispoal Area, the Corps has carefully examined the environmental and economic trade-offs between the dredged material disposal alternatives. The 1,710 acre site of the Brookley disposal area comprises about 5 percent of the total shallow-water area of Mobile Bay. Shallow-water areas refer to those areas less than 6 feet deep which are generally considered important to the production of shrimp and other estuarine dependent species. While past dredged material disposal, sanitary waste disposal practices, and natural sedimentary processes have adversely affected the ecological integrity of this sector of the Bay, it does possess moderate recreation and commercial fishing values which must be properly considered in project formulation, including the development of necessary mitigation measures associated with effects of the proposed disposal area.

It is our view that environmental mitigation measures, identified in the feasibility report, provide an effective and efficient way to mitigate for loss of resource values and ecological damages due to establishment of the Brookley Disposal Area. Furthermore, elimination of the Brookley Disposal Area would cost an additional $100 million and result in economic opportunities foregone due to land enhancement estimated to be about $3,000,000 annually.

I appreciate your concern regarding the fishery habitat in Mobile Bay; however, after weighing the overall environmental impacts of considered alternative dredged material disposal plans against their financial and economic costs, I conclude that it is in the public interest to adopt the selected disposal plan.

The letter from the Assistant Administrator for Fisheries, together with a copy of this reply will be included with the report when it is submitted to the Congress.

Sincerely,

J. K. Bratton

J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

COMMENTS OF THE ENVIRONMENTAL PROTECTION AGENCY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

July 16, 1981

4SA-EIS

Lieutenant General J. K. Bratton
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Attention: DAEN-CWP

Dear General Bratton:

The U. S. Environmental Protection Agency (EPA) has reviewed the Survey Report and Final Environmental Impact Statement (FEIS) on the proposed channel deepening for navigation for Mobile Harbor (Mobile County), Alabama. The Survey Report and Final EIS clearly demonstrate the need for the proposed channel modifications and EPA has no objections to these improvements, per se. EPA does, however, continue to have strong reservations about the selected alternative for the disposal of the dredged material. EPA believes that this alternative (Brookley Expansion Area and Gulf Disposal Plan #1, Modified) will have significant long-term adverse effects on the Bay's aquatic ecosystem. We continue to believe that there are practicable alternatives for the disposal of dredged material which will have fewer environmental impacts. Further, we are concerned that no specific mitigation measures have been developed which will offset the impacts of the proposed fill.

The filling and permanent loss of 70 acres of marsh and 1710 acres of productive shallow-water bay bottom constitutes a significant, irreversible, and we believe unnecessary, adverse impact to the Mobile Bay ecosystem. The values of the wetland and shallow water habitats and their contribution to the overall vitality of the Bay are well documented. The Fish and Wildlife Coordination Act Report, contained within the FEIS, establishes the vital importance of the Bay's shallow water bottoms, grassbeds and tidal marshes as spawning and nursery habitat for a major portion of the marine and freshwater finfisheries and shellfisheries that inhabit the Alabama Coastal Zone (FEIS, App. 4, p. 6). Commercial fishing has been characterized as one of the most important natural assets of the State. In 1977 the economic value of this marine fishery was estimated at $48 million. (Alabama Coastal Area Management Plan and Final Environmental Impact Statement, August 1979, p. 41.) The adverse impacts associated with the loss of these resources which support this commercially valuable fishery are unquestionable. Further, implementation of the proposed fill alternative could set a precedent for other major harbors in the Southeast which have spoil disposal problems that could result in even further environmental losses throughout the Region.

Detailed discussions of our views on this project are expressed in our letter of January 5, 1981, to the Board of Engineers for Rivers and Harbors, our letter of August 29, 1979, covering the review of the Draft EIS and our public statement of July 31, 1979. For your convenience we have enclosed copies of all of these documents and request that they be attached to any communication regarding this project as it proceeds through the congressional process.

In accordance with the 1980 CEQ Guidance on Applying Section 404(r) of the Clean Water Act, we have also conducted a detailed review of the 404(b)(1) analysis contained within the EIS. EPA believes that the information in this EIS contains adequate information on the effects of the disposal, within the meaning of Section 404(r) of the Clean Water Act. EPA has, however, determined because of the effects associated with the filling at the Brookley expansion site that this project as proposed is not consistent with the Section 404(b)(1) guidelines. Our detailed analysis is enclosed.

Of continuing concern to this Agency is the manner in which Federal actions are contributing to the unplanned, piecemeal destruction of the productive ecosystem in Mobile Bay. As you know, existing dredge and fill activities within the Bay have already adversely altered natural physical, chemical and biological conditions within the Bay. The problem continues with the proposed fill at the Brookley expansion area and other proposed fill expansion areas in Mobile Harbor. We believe that these expansions, if left to occur in a piecemeal, unplanned fashion will cause further destruction of many of the Bay's natural assets. To avert this inevitable result, we believe that a comprehensive resource use plan for the Bay is needed.

The State of Alabama, Coastal Area Management Board, has expressed interest in preparing such a comprehensive resource use plan for Mobile Bay. We support this concept and believe such a planning effort would bring together local, state, and Federal interests in a way that would allow rational long-term resource use decisions to be made for the entire Bay System.

Congress has recently specifically endorsed this concept as a means of providing for "increased specificity in protecting significant natural resources, reasonable coastal-dependent economic growth, improved protection of life and property in hazardous areas, and improved predictability in governmental decisionmaking" (P.L. 96-464).

Such an effort would draw upon the numerous studies that are currently underway to characterize and model existing conditions within the Bay. These studies, which include benthic, fishery, birds and mammals, and wetland considerations, are being sponsored by the Alabama Coastal Area Management Board and the Mississippi Sound and Adjacent Areas Study being conducted by the Corps. When completed, these studies will provide critically needed data to support rational decisions on the placement of fill and location of industrial expansion areas.

With this existing or soon to be completed technical data base, a collaborative planning effort could be completed before a final decision on the disposal of dredge material at the Brookley expansion area is required. In fact, the studies the Corps would be required to undertake to verify proposed mitigation measures prior to receiving final plan certification from the Alabama Coastal Area Management Board could be integrated into the larger planning effort without affecting the timely completion of the channel deepening project.

EPA believes that it is essential that the State be afforded the opportunity to plot the future of the Bay before further irreversible resource commitments are made. Accordingly, we endorse the comprehensive resource use plan concept for Mobile Bay as a method for resolving the remaining disagreements over the filling of the Brookley site. We believe that such an effort can be undertaken without delaying the navigation improvement and we urge the Corps to carefully consider this proposal and factor it into its final decision on this project.

For nearly ten years EPA has worked extensively with the Mobile District of the Corps of Engineers to develop a plan for the improvement of Mobile Bay which will have the fewest environmental impacts. Through the commitment of both agencies significant issues were resolved. I remain optimistic that through the collaborative effort proposed by the State, acceptable resolutions to the remaining issues will be found.

If we can be of any assistance to you in this matter, please do not hesitate to contact me.

Sincerely yours,

Rebecca W. Hanmer

Rebecca W. Hanmer
Regional Administrator

Enclosure:
Detailed Analysis

Detailed Comments

1. The proposed fill is not consistent with the 404(b)(1) guidelines of the Clean Water Act:

The filling and permanent loss of 70 acres of marsh and 1,710 acres of productive shallow-water bay bottom constitutes an unacceptable, irreversible adverse impact to the Mobile Bay ecosystem as an individual impact. Significant temporary water quality degradation can be expected at the fill site as a result of elevated turbidities, increased siltation and potential release of sediment bound pollutants in the dredged material. Mud flows from the proposed dike construction at the Brookley expansion site can be expected to seriously impact benthic communities in approximately 1,300 acres of adjacent shallow bay bottoms causing non-compliance with the restriction on discharge 230.10(c) of the 404(b)(1) guidelines, which addresses the significance of degradation of U. S. waters. Shallow water bay areas (depth less than six feet) are recognized as the most productive and essential fish and wildlife nursery and habitat areas in the bay. Loss of the 1,710 acres of bay bottom at Brookley would eliminate approximately 5% of Mobile Bay (less than six feet deep) and would unacceptably affect the values enumerated in Section 230.31 of the 404(b)(1) guidelines. This action would permanently reduce the carrying capacity of Mobile Bay for supporting fish and wildlife resources. Long-term impacts resulting from the 1,710 acre fill at Brookley would be potential alteration of circulation patterns (404(b) guidelines, Section 230.23) in the bay and the attendant salinity changes (Section 230.25) that could result in significant impacts to biota.

2. No specific mitigation measures have been developed to offset the impacts of the proposed fill:

Although a number of mitigation measures are planned to improve the overall functioning of the bay, none are designed to offset the loss of the wetlands and shallow bottoms associated with the Brookley fill. The suggested measures would be called for, even in the absence of this project, to correct environmental damages caused by previous development within the bay.

The entire bay contains approximately 264,000 acres of open water; however, the northern portion together with those shorelines having depths less than six feet are the most productive. The loss of this shallow water habitat area would eliminate a significant portion of the Bay's valuable benthic invertebrate community. In addition to the direct loss due to filling, mud flows radiating out from the filled area could adversely impact as much as an additional 2 square miles of productive shallow-water estuarine bottoms unless drastic countermeasures are taken. The traditional approach of establishing marsh will not mitigate this loss since it consumes additional productive bay bottoms.

Currently planned mitigation fails to comply with the restriction of discharge of Section 230.10(d) of the 404(b) guidelines.

3. Environmentally preferable alternatives exist:

In our opinion there are other environmentally acceptable alternatives for disposal of spoil material without destruction of the bay bottom and/or marsh land and other alternatives for the industrial development that will evolve on the fast land created by the proposed design. The Corps of Engineers' letter of October 4, 1979, to EPA states in part, ". .on the basis of our studies to date of the various alternatives for disposal of dredged material, we concur with your view of the gulf being a viable disposal area in terms of physical impacts and environmental acceptability for material that would be excavated from Mobile Bay. In fact, as noted in our draft feasibility report, implementation of all plans that we have identified for detailed consideration not only includes but is dependent upon gulf disposal for major portions of the material to be dredged."

Further, the Gulf Disposal Site is located within the 16-mile limit, the distance the Mobile Office of the Corps of Engineers gave as the distance within which the cost-benefit ratio of the project would exceed 1.1 to 1 (see EPA letter to Corps dated November 2, 1979, in response to the Corps letter of October 4, 1979). Therefore, all spoil material from the proposed project could be disposed of at the approved Gulf Disposal Site and the overall project would still have a favorable cost/benefit ratio (approximately 1.2:1).

Additionally in our letter of January 5, 1981 (attached) to the Board of Engineers for Rivers and Harbors, but not mentioned in the EIS, we proposed the possibility of constructing a channel inland at or near the Arlington Channel into the Brookley Field area. This alternative would minimize the destruction of marsh and estuarine areas since most of the area involved would be uplands. The only aquatic or marsh areas lost would be those occupied by the channel. The developed area could even be used as a disposal site for materials from the channel which would elevate it above hurricane flood tides.

Still another possibility is better utilization of existing areas adjacent to the existing channels with subsequent expansion into the Theodore Industrial area as necessary.

The existence of practicable alternatives that are likely to have less adverse impact on the aquatic ecosystem (without other significant adverse environmental consequences) leads us to conclude that the proposed discharge is not in compliance with the restriction on discharge in Section 230.10(o) of the 404(b)(1) guidelines.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

4E-ER/WET

JAN -5 1981

Board of Engineers for Rivers and Harbors
Kingman Building
Fort Belvoir, Virginia 22060

SUBJECT: Feasibility Report
Mobile Harbor, Alabama

Dear Sir:

This is in response to the Public Notice, dated November 6, 1980, and the addendum to the Public Notice, dated December 5, 1980, relating to the feasibility report on the improvement of Mobile Harbor, Alabama, and the FEIS for this proposed project included in the appendixes.

Our concerns regarding the project remain essentially the same as outlined in our review of the DEIS in the EPA letter of August 29, 1979, and our public statement of July 31, 1979. These concerns involved the impact on fish and wildlife resources and water quality resulting from the filling of productive bay bottoms and shoreline marsh, possible changes in current patterns and salinity and their effect on oyster production, and the potential of the project for general degradation of the physical and biological integrity of the aquatic ecosystem of Mobile Bay. However, our main objection to the recommended plan, the Brookley Expansion area and Gulf Disposal Plan No. 1 (modified), is that it involves the filling of approximately 1,710 acres of productive bay bottoms and about 70 acres of shoreline marsh.

The reasons for filling the Brookley Expansion area in Mobile Bay are not fully validated in the EIS. Our contention is that other areas in the vicinity of the upper harbor and the Theodore Industrial Park can be more fully developed in lieu of filling in the Brookley area. Also, the Gulf Disposal Plan No. 1, which EPA and most of the Conservation Agencies recommended in lieu of the Brookley Expansion Plan, will provide all the essential shipping needs of the area with significantly less damage to the overall environment than the recommended plan. Furthermore, that portion of the expansion of the Mobile Harbor which may be attributed to an increase in traffic from the Tennessee-Tombigbee Waterway may be overestimated. Although considerable traffic will move through the Tennessee-Tombigbee Water to and from northern Alabama and Mississippi and the upper Tennessee River, one of the main project objectives of the waterway, which was to provide more economical transportation to much of the mid-continent region of the United States, may not be fully realized.

The Ohio River Basin Commission in the Regional Water and Land Resources Plan, Cumberland River Basin, has come to the conclusion that the impact of the Tennessee-Tombigbee Waterway on transportation from the Cumberland River Basin, which is the major producer of coal and minerals in Kentucky and Tennessee, will be minimal. They state that "the Cumberland's proximity to the lower Mississippi for movement south will preclude movement of new and present traffic through the heavily locked Tennessee-Tombigbee Waterway." If the supposition is true for the Cumberland River it is probably true for the entire Ohio except for the portion of the Tennessee River above Kentucky Lake.

Before encroaching on the bay estuarine and marsh areas, full utilization should be made of existing upland sites. Room for expansion presently exists at Theodore Industrial Park, at the Brookley Industrial area opposite Garrows Bend, at Brookley Field, McDuffie Island, and Pinto Island. Space will also be available on Blakeley Island for shallow draft vessels. Much of this space is included in the expansion plans but considerable space will still remain and the necessity for filling the Brookley area, except for the convenience of spoil disposal, is seriously questioned.

An alternative not mentioned in the EIS is the possibility of constructing a channel inland at or near the Arlington Channel to the Brookley Field area. This would minimize the destruction of marsh and estuarine areas. All lands developed would be in upland areas. The only aquatic or marsh areas lost would be these occupied by the channel.

It is noted, Appendix 1, Page 4, that mitigation is offered for the 70 acres of marsh at the south end of the Brookley Expansion area. This is a backwater area where deposition would naturally take place and there should be no problem with establishing marsh in the area, particularly in a wedged shaped area bordering on the southwest corner of the site and the existing shoreline.

However, it is noted that no mitigation is offered for the 1,710 acres of productive estuarine areas filled at the Brookley Site or the shallow water estuarine areas occupied by the channel widening and turning basins. If the proposed plan is placed into operation, we believe these areas should be fully mitigated, in addition to correcting circulation, by providing openings through the spoil piles built up by past dredging operations. We believe the circulation should be corrected if the Gulf Disposal Plan or any other alternative is used. We believe cutting passageways through the spoil piles would improve circulation and lessen some of the low DO problems now being experienced in some portions of the bay, although this procedure could not be expected to fully alleviate the problem because of other factors contributing to the low DO's. Water quality has been degraded in the Garrows Bend area and a bridge should be provided in lieu of the causeway to connect McDuffie Island to the mainland.

It can be expected that the secondary impacts of the project, including industrial, commercial and residential buildup and the associated point and non-point source discharges, will have a significant adverse impact on the bay ecosystem and water quality values. The increase in fecal-coli contamination from surface runoff from the developed areas will have a direct impact on oyster production in the bay area and possibly in Mississippi Sound, particularly if there is development in the drainage area of Fowl River or streams draining into Mississippi Sound.

There will be increased turbidity from shipping, increased oil and material spills, increased sanitary boat waste, and bilge and solid waste problems which will all lead to a general degradation of water quality values in the bay area.

To summarize, our views and recommendations regarding the project and the EIS are as follows:

(1) We recommend that the Gulf Disposal Plan No. 1 be used wherein all new work and maintenance materials would be deposited in an approved Gulf Disposal Site.

(2) Mitigation of water quality values should be accomplished by providing circulation channels through the spoil piles which exist on both sides of the upper bay channel and by removing the causeway and providing a bridge to McDuffie Island. Post spoil disposal practices have built up ridges and formed pockets in the upper bay area which has hindered circulation and contributed to the degradation of water quality. A detailed study should be made of methods for correcting this condition.

(3) We believe the losses caused by the recommended project cannot be mitigated within Mobile Bay. The productive aquatic estuarine areas lost cannot be replaced and replacing them with marsh will cause the loss of additional estuarine area.

(4) The necessity of acquiring 1,047 acres of fast land for port expansion by filling the Brookley Expansion area is not fully validated in the EIS. Also, several alternatives exist which would have less adverse impact on the environment.

(5) The 404(b) evaluation (under 6a. Need for the Proposed Activity or any other section) does not adequately justify the necessity for filling the productive estuarine and marsh areas comprising the Brookley Expansion Area. Therefore, we do not consider this project eligible for the Section 404(r) exemption status.

Sincerely yours,

Rebecca W. Hanmer

Rebecca W. Hanmer
Regional Administrator

cc:
COL Ryan, Mobile COE
S. Atlantic COE
Fish & Wildlife

Submitted to RA's Office
2:30 p.m. July 30, 1979

STATEMENT CONCERNING THE PROPOSED NAVIGATION IMPROVEMENTS MOBILE HARBOR, ALABAMA MOBILE MUNICIPAL AUDITORIUM

JULY 31, 1979

Good evening ladies and gentlemen. My name is John C. White. I am the Regional Administrator of Region IV of the Environmental Protection Agency. My purpose in appearing at this hearing is to provide comments for the proposed construction of a 55-foot deep ship channel for Mobile Bay.

We have in past public hearings expressed environmental concerns for developments in Mobile Bay and their impact on this fragile ecosystem. Our immediate concern with this project is the potential water quality effects of the deepened ship channel and effects of spoil disposal. The proposed spoil peninsula in the upper bay area would occupy an additional 1,710 acres of shallow water estuarine area which would eventually contain shipping berths at the upper end. It is our belief that the south dike of this peninsula would act as a jetty to form a backwater area for additional deposition of solids coming down Mobile River. The 55-foot deep by 500-foot wide ship channel through Mobile Bay would form a more voluminous and dynamic salt wedge which could affect the entire hydrological and much of the biological aspects of the bay. Although the model tests conducted at Vicksburg did not represent the exact features of the proposed plan, they indicated that salt water intrusion would extend further up the Mobile River and the salt wedge would increase fresh water flow down the Tensaw River. The diversion of these waters could cause incidences in the frequency of standards violations and therefore increase the cost of wastewater treatment at Mobile to meet water quality standards. Additional problems would be caused by the change in the overall salinity distribution within Mobile Bay. Model tests indicate an increase in the salinities of the upper bay area with the greatest increases near the channel, decrease in the salinity of Bon Secour Bay and probable increases in the salinity of the lower bay west of the channel. The effect on oyster production in the lower bay cannot be accurately predicted from model studies, however, changes in salinity are known to impact shellfish production.

Other changes related to salinity and water quality would involve increased turbidities along the east shore, low D.O.'s in the bottom of the 550-foot wide channel, changes in the marsh types in Bon Secour Bay, a decrease in the waste assimilative capacity of the Mobile River and general degradation of the water quality in the upper harbor area.

Air quality problems already exist in Mobile County to the point of violating ambient air quality standards. It can be expected that the increase in truck and rail traffic and the secondary expansion which will take place as a result of the project will further degrade air quality unless a concerted effort is made to clean up all sources of pollution.

Since the inception of the Mobile Harbor Project, more than 2,000 acres of marsh and shallow water estuarine areas valuable for fish and wildlife habitat have been lost as spoil disposal sites in Polecat Bay and in the Blakely and Pinto Island areas. Approximately 1,280 acres of bay bottoms and 26 acres of marsh have been lost in the construction of the Theodore Industrial Project alone. Additional marsh and shallow water estuarine areas have been disrupted and degraded in the Dog and Fowl River areas.

The value of these marsh and estuarine areas are well recognized. In addition to providing valuable fish and wildlife habitat, the marsh filters and assimilates nutrients and pollutants thereby improving water quality, and produces detrital matter which forms the base of the food chain for estuarine organisms.

Therefore, if this channel deepening project is activated, we prefer the Gulf Disposal Plan, where all materials, new work and maintenance, would be deposited in the Gulf. We believe the Gulf of Mexico has a better capacity for assimilating the huge amounts of materials involved than does Mobile Bay. In our letters of October 24, 1974, and November 22, 1975, we recommended against the disposal of dredged material in Mobile Bay.

We also believe that additional modeling studies should be conducted to determine the effect of the channel deepening on water quality before the project is activated. We are especially concerned about potential impacts to shellfish and shellfish harvesting.

We recognize the desire on the part of State and local authorities for optimum development of port facilities, but we also recognize that for every benefit to be derived there are environmental costs that must be considered. In this instance, we believe the environmental costs, or damages, may be of sufficient magnitude to require disposal of all new work material and dredged maintenance material from the enlarged Mobile Ship Channel and Theodore Ship Channel in the Gulf of Mexico. Maintenance material from the authorized 40 by 400-foot Theodore Industrial Channel could be placed in the Theodore Disposal Island until its capacity is reached. At such time, additional maintenance material would also be disposed of in the Gulf.

I appreciate the opportunity to be here to present these views to you.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30308

AUG 29 1979

4SA-EIS

Mr. Lawrence R. Green
Corps of Engineers, Mobile District
P. O. Box 2788
Mobile, Alabama 36628

Dear Mr. Green:

1 We have reviewed the Draft Environmental Impact Statement on the Channel Improvements to Mobile Harbor and have some reservations regarding the long-term environmental consequences of the proposed intrabay spoil disposal and subsequent fast land creation. We are concerned for the overall impact on water quality resulting from the deepened ship channel and open water dispersal of spoil. Further, the sacrifice of 1,710 acres of shallow water estuary bottoms in the upper bay for spoil disposal and fast land creation represents an important ecological loss. The peninsula formed by this disposal area may act like a groin to cause a backwater for additional deposition of solids coming down Mobile River.

2 The enlarged ship channel is going to affect certain hydrological and biological aspects of the bay by creating an enlarged and more dynamic salt wedge. Although the model tests conducted at Vicksburg did not represent the exact features of the proposed plan, the results indicated that salt water intrusion would extend further up the Mobile River while increasing the fresh water flow down the Tensaw River. The diversion of the present flow pattern could decrease the assimilative capacity in certain areas of both the river and the bay and lead to increased frequency of water quality standards' violations, causing an increase in the cost of waste water treatment at Mobile to meet these standards.

3 Additional problems would be caused by the change in the overall salinity distribution within Mobile Bay. Model tests indicate an increase in the salinities of the upper bay area with the greatest increases near the channel, decrease in the salinity of Bon Secour Bay and probable increases in the salinity of the lower bay west of the channel. The effect on oyster production in the lower bay cannot be accurately predicted from model studies; however, changes in salinity are known to impact shellfish production.

We do not concur with some statements in the 404(b) evaluation and find other sections not fully addressed.

404(b) Evaluation

Page 2, 2. Physical Effects (a)(1). About 10 acres of wetlands habitat
exist along the shore of the Brookley Expansion area spoil site while
the contiguous shallow water areas are valuable nursery and feeding areas
for shrimp, crabs and fish. Since the inception of the Mobile Harbor
Project more than 2,000 acres of marsh and shallow water estuarine areas
valuable for fish and wildlife habitat have been lost as spoil disposal
sites in Polecat Bay and in the Blakely and Pinto Island areas. Approximately 1,280 acres of bay bottoms and 26 acres of marsh have been lost
4 in the construction of the Theodore Industrial Project. Additional marsh
and shallow water estuarine areas have been disrupted and degraded in the
Dog and Fowl River areas.

The value of these marsh and estuarine areas is well recognized. In addition to providing valuable fish and wildlife habitat, the marsh filters and assimilates nutrients and pollutants, thereby improving water quality. It also produces the detrital material which forms the base of the food chain.

Page 4, d. Other Effects (3) Salinity Gradients

We disagree with the statement that "construction of the disposal area
would not be expected to significantly affect salinity gradients." The
salt wedge will occupy most of the channel and under normal flood tide
conditions will cause the fresh water to spread out laterally. Since
the west side of the channel would be blocked by the proposed Brookley
Spoil Peninsula, and the north dike of the spoil site is oriented to the
southeast, most of the fresh water will be directed to the southeast.
At the present time most of the fresh water flow goes down the west side
5 of Mobile Bay. More fresh water will also be directed to the southeast
between Pinto Island and Little Sand Island because of the restriction
in flow caused by the Brookley Peninsula. Model tests indicate an increase in the salinities of the upper bay area, especially near the
channel, a decrease in the vicinity of Bon Secour Bay, and probable
increases in the salinity of the lower bay west of the channel. The
effect on oyster production in the lower bay cannot be accurately predicted from these model studies; however, changes in salinity are known
to impact shellfish production. The Final EIS should explain the probable
physical and biological consequences of these salinity alterations in
greater detail.

Page 6, c. Objectives to Be Considered in Discharge Determination

6 The EPA guidelines state that (1) "discharge activities that significantly
disrupt the chemical, physical and biological integrity of the aquatic

ecosystem, etc., should be avoided." It should be recognized that the 1,710 acres of shallow water ecosystem which are eliminated by the construction of the Brookley Disposal Site represent a significant disruption of the physical and biological integrity of the acquatic ecosystem of Mobile Bay. Similarly, Section 230.4-1(a)(1) states that from a national perspective, the degradation or destruction of aquatic resources by filling operations in wetlands is considered the most severe environmental impact covered by these guidelines. You should assess the impact of either the specific or cumulative reductions. (2) "avoid discharge activities that significantly disrupt the food chain including alterations or decrease in diversity of plant and animal species." It is acknowledged in Section 4.44 that changes in salinities will be widespread and affect almost every environmental feature in the bay. Also, eliminating significant portions of shallow bay bottoms will have a detrimental effect on shrimp and fish which constitute the base of the faunal component of the trophic web.

7 Air quality problems already exist in Mobile County to the point of violating ambient air quality standards. It can be expected that the increase in truck and rail traffic and the secondary expansion which will take place as a result of the project will further degrade air quality unless a concerted effort is made to effect a solution. The Final EIS should detail what efforts will be made to avoid standards' violations.

8 If this channel deepening project is undertaken, we prefer the Gulf Disposal Plan, i.e., all material deposited in the Gulf. Although this method is not without its own adverse impacts, we believe the Gulf of Mexico has a better capacity for assimilating the huge amounts of materials involved than does Mobile Bay. This contention was expressed in our letters of October 24, 1974, and November 22, 1975, as well as by my statement at the July 31, 1979, Public Meeting. We also believe that additional modeling studies should be conducted to determine the effect of the channel deepening on water quality before the project is initiated. We are especially concerned about potential impacts to shellfish and their harvesting.

We recognize the desire on the part of State and local authorities for optimum development of port facilities, but we also feel that for every benefit to be derived there are environmental costs that must be considered. In this instance, we believe the environmental costs or damages are of sufficient magnitude to warrant offshore disposal. Similarly, maintenance material from the Theodore Industrial Channel should be taken to the Gulf after the Theodore Disposal Island is filled to capacity.

9 A rating of ER-2 was assigned, i.e., we have environmental reservations to the facility and additional data are required.

Sincerely yours,

John C. White

John C. White
Regional Administrator

LETTER TO THE ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO
ATTENTION OF:
DAEN-CWP-A

18 November 1981

Mr. Charles R. Jeter
Regional Administrator
Environmental Protection Agency
Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Dear Mr. Jeter:

This is in reply to the recent letter from your predecessor, Ms. Rebecca Hanmer, commenting on my proposed report on Mobile Harbor, Alabama.

We know that the highly productive wetlands and shallow water habitats are valuable to the Mobile Bay ecosystem. We are also aware of the opposition to the Brookley disposal area and that this site selected in upper Mobile Bay to contain the new work dredged disposal material will permanently remove 1,710 acres of shallow-water habitat. However, we do not agree that this site is highly productive relative to other shallow-areas of the bay. All of the project construction activities within the upper bay will be in areas that have been subject to disturbances by periodic maintenance dredging, dredging for fill, or port related activities. The Brookley Expansion area would abut an existing man-made fill area.

A large part of the wetlands area has been significantly disturbed by trash dumping and fill activities. A well designed marsh establishment program will offset the wetland loss and provide for possible creation of waterfowl habitat similar to the Theodore Island. Also, future studies will address mitigation measures to offset the loss of bay bottom, such as, reestablishing the interaction of Chacaloochee Bay with Mobile Bay by providing additional openings in the Mobile Delta causeway.

Construction of a dispoal area in the upper bay, in this specific case, not only utilizes the material as a resource to produce regional economic benefits for land enhancement, but provides significant savings in disposal of new work dredged material. The only other disposal site for this material, preferred by many environmental interests, is the Gulf of Mexico and the additional $100 million for implementing this plan is not considered justified.

Our future studies of the proposed channel deepening and related mitigation measures will be closely coordinated with the Environmental Protection Agency and the State of Alabama Coastal Area Management Board. I support the State's interest in preparing a comprehensive resource use plan for Mobile Bay. Such a plan would certainly aid in planning the area's water related development.

Your predecessor's letter, together with a copy of this reply will be included with the report when it is submitted to the Congress.

Sincerely,

JK Bratton
J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

Mr. [illegible]
Regional Administrator
Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

Dear Mr. [illegible]:

[illegible] Mobile Harbor, Alabama.

[illegible]

[illegible]

[illegible]

MOBILE HARBOR, ALABAMA

REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

REPLY TO ATTENTION OF:
DAEN-CWP-A

18 November 1981

SUBJECT: Mobile Harbor, Alabama

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on Mobile Harbor, Alabama. It is accompanied by the reports of the Board of Engineers for Rivers and Harbors and the District and Division Engineers. These reports are in response to a resolution adopted 24 June 1965 by the Committee on Public Works of the United States House of Representatives. The Committee requested the Board to review the reports on Mobile Harbor, Alabama, and other reports with a view to determining whether the existing navigation project should be modified.

2. The District and Division Engineers recommend that the existing project for Mobile Harbor, Alabama, be modified to provide deep-draft navigation improvements. Their recommended plan provides for deepening and widening existing channels to accommodate large ocean-going bulk cargo vessels transporting coal and iron ore and for the disposal of all maintenance dredged material from the existing and proposed project in the Gulf of Mexico. Dredged material for proposed new works in the entrance channel to Mobile Bay and in the lower bay ship channel would also be placed in the Gulf while new work dredged material from the upper bay would be placed in a 1,710-acre confined disposal area. Measures to mitigate the loss of wetlands and bay bottom productivity are included as part of the selected plan. Major components of the plan are:

a. Deepen and widen entrance channel over the bar to 57 by 700 feet, a distance of about 7.4 miles.

b. Deepen and widen Mobile Bay Channel from mouth of bay to south of Mobile River, 55 by 550 feet, a distance of about 27.0 miles.

c. Deepen and widen an additional 4.2 miles of Mobile Bay Channel to 55 by 650 feet.

d. Provide 55-foot deep anchorage area and turning basin in vicinity of Little Sand Island.

e. Construct a 1,710-acre dredged material disposal area adjacent to the Brookley industrial complex.

The cost of these modifications is estimated by the reporting officers at $338,072,000, based on August 1980 price levels. The non-Federal portion of the cost is estimated at $42,578,000, which includes a cash contribution by the State of Alabama. The benefit-cost ratio is 1.6.

3. The Board of Engineers for Rivers and Harbors concurs generally with the views and recommendations of the reporting officers. The Board believes that the recommended channel improvements are needed, are technically sound, and are economically feasible. The Board notes the opposition to the Brookley expansion disposal area by the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, and various local interests. The opposition is based on the supposition that this project feature would adversely impact on: wetlands which fringe the project area, commercial and recreational fisheries, esthetic values and existing land uses along the Brookley waterfront. The Gulf Disposal Plan No. 1 shown in the feasibility report, which would avoid these adverse impacts by placing all new construction dredged material in the Gulf of Mexico, is the alternative preferred by these Federal and local interests. Additionally, the Alabama Coastal Area Board has certified the recommended plan specifically conditioned on mitigation of adverse effects associated with the Brookley disposal area.

4. The Board carefully examined the environmental and economic trade-offs between the respective dredged material disposal alternatives. The 1,710-acre site of the Brookley disposal area consists of 5 percent of the total shallow-water area of Mobile Bay i.e., those areas less than 6 feet deep which are generally considered important to the production of shrimp and other estuarine dependent species. While past dredged material disposal, sanitary waste disposal practices, and natural sedimentary processes have adversely affected the ecological integrity of this sector of the Bay, the Board believes that this area does possess moderate recreation and commercial fishing values which must be properly considered in project formulation, including the development of necessary mitigation measures.

5. The Board finds that the anticipated adverse impacts resulting from establishment of the Brookley disposal area can be offset to a large extent by planned and potential environmental mitigation measures. Among these are:

a. Gulf disposal of all maintenance dredged material over the life of the project.

b. Restoration of circulation and improving water quality in the channel behind McDuffie Island by providing openings in the McDuffie Island causeway which has made this area a closed cul-de-sac.

c. Creating marshes adjacent to the southern boundary of Brookley disposal area to replace the estimated 70-acre loss of wetlands presently fringing the shoreline in that area.

d. Restoration of tidal action to Chacaloochee Bay and Big Bateau Bay by providing openings in the Mobile Delta causeway.

The total cost of all recommended mitigation elements is estimated at $2,900,000.

6. In addition to these mitigation measures, the Board concurs with the reporting officers that other potential environmental improvement measures be studied prior to project implementation to determine their technical feasibility and cost-effectiveness. The objective of such study would be to develop an environmental quality plan capable of improving environmental conditions in Mobile Bay and related waterways above without project levels. Potential environmental improvement measures include:

a. Improving circulation in Mobile Bay by creating openings in existing ridges of dredged material which parallel the main ship channel from Dog River to the mouth of Mobile River.

b. Filling natural depressions in Mobile Bay which are believed to contribute to adverse water quality conditions.

c. Establishing a recycling plan to remove dredged material from existing Blakeley and Pinto Islands dredged material disposal areas.

d. Establishing oyster beds in Bon Secour Bay which preliminary model studies indicate may be beneficially affected by the deepening project.

7. It was the view of the Board that the recommended environmental improvement measures provide an effective and efficient way to mitigate for loss of resource values and ecological damages due to establishment of the Brookley disposal area. Also, according to the reporting officers, Gulf Disposal Plan No. 1 would entail an additional first cost of about $100 million due to higher dredging and haulage costs involved with total Gulf disposal. Furthermore, elimination of the Brookley disposal area would result in economic opportunities foregone due to land enhancement estimated at about $2,700,000 annually. After weighing the overall environmental impacts of considered alternative dredged material disposal methods against their financial and economic costs, the Board concludes that it is in the public interest to adopt the reporting officers' selected disposal plan.

8. The Board also notes that commodity projections for deep-draft movements of iron ore, coal imports, and metallurgical coal exports are derived essentially from studies and data available in 1975. Based on more current information, it appears that future demand for these commodities will be

lower than estimated in the feasibility report. Conversely, the report analysis did not reflect the substantial growth in worldwide demand for steam coal which has developed in recent years in response to spiraling increases in world petroleum prices. Accordingly, the Board requested the reporting officers to reassess the projected commerce and to provide a reevaluation of navigation benefits taking into account information developed in 1980 by the President's Interagency Coal Export (ICE) Task Force and other sources pertaining to the future outlook for steam coal exports. The Board also requested updated information concerning plans by local interests for new or expanded bulk commodity handling facilities to accommodate deep-draft vessels. Based on this reevaluation, including recontacts with prospective shippers and port interests, average annual benefits decreased for some categories and increased for others in comparison with the feasibility report, thereby resulting in a net increase in navigation benefits from $50,061,000 to $51,614,000.

9. The Board finds that estimated land enhancement benefits and associated local contributions were based on outdated data. Recomputation using August 1980 price levels and 7-3/8 percent interest rate resulted in revised land enhancement benefits of $2,742,000. Accordingly, 5 percent (percent land enhancement benefits to total benefits) of Federal construction cost, currently estimated at $17,300,000, has been allocated to local interests as part of the non-Federal contribution to the project.

10. Based on its review of estimated dredging costs in the report, the Board believes that costs for dredging the upper bay channel should be increased by about 20 percent, or $15,216,000. Also, existing berthing facilities will have to be modified to accommodate a 55-foot navigation channel. Costs of such modifications are a local responsibility and are presently estimated at about $4,000,000. The Board also notes some differences in the feasibility report concerning the amount of material required and costs for constructing necessary retaining dikes for the Brookley disposal area. The cost of dike construction, also a local responsibility, is based on the difference in cost of dredging with and without containment, presently estimated at 0.5 percent of the cost of dredged material to be placed in the disposal area, or about $460,000. With these adjustments by the Board, costs for the proposed deepening project based on August 1980 prices and the prescribed 7-3/8 percent interest rate are summarized as follows:

	Costs		
Item	Federal	Non-Federal 1/	Total
First cost	$313,000,000	$50,400,000	$363,400,000
Annual cost	29,800,000	5,000,000	34,800,000

1/ Includes 5 percent contribution per President's 1978 proposed cost-sharing policy.

Based on revised total annual benefits of $54,356,000, the benefit-cost ratio remained at 1.6.

11. The reporting officers recommended that the State of Alabama contribute five percent of the construction cost in accordance with previously proposed cost sharing policy. On July 15, 1981, the Department of the Army, on behalf of the Administration, transmitted proposed legislation to Congress that would provide for full recovery of certain operation, maintenance and construction or rehabilitation costs for deep draft channels and ports with authorized depths greater than 14 feet. When this legislation is enacted, Corps of Engineers expenditures for the Mobile Harbor, Alabama, Deep Draft Navigation Project will be subject to recovery as provided in the proposed legislation. Accordingly, non-Federal interests would be required to reimburse the Federal government for construction of navigation features of the recommended plan, and all subsequent expenditures for operation, maintenance and rehabilitation; except for expenditures assigned by the Secretary of the Army to governmental vessels in non-commercial service. The proposal to fully recover these costs supersedes the previous requirement for a 5 percent state cash contribution.

12. The entire amount of the Federal construction or rehabilitation expenditures to be reimbursed, including interest during construction and interest on the unpaid balance would be reimbursed within the life of the project, but in no event to exceed fifty years after the date the project becomes available for use. The interest rate for reimbursement purposes would be determined by the Secretary of the Treasury based on the average market yields on outstanding obligations of the United States. Reimbursements for operation and maintenance would be made annually, and may be scheduled and periodically adjusted to result in the payment of actual operation and maintenance costs. The non-Federal public body would be authorized to recover its reimbursement obligations pursuant to this requirement by the collection of fees for the use of the project by vessels in commercial waterway transportation.

13. I concur with the findings, conclusions and recommendations of the Board with the exception of the requirement that the State of Alabama contribute 5 percent of the construction cost. In lieu of that requirement and in accordance with the Administration's July 15, 1981 proposed legislation, I recommend that the Mobile Harbor, Alabama, Deep Draft Navigation Project be authorized for implementation with the provision that prior to implementation local interests will agree to reimburse the Federal government for all expenditures for the construction of navigation features of the recommended plan, and all subsequent expenditures for operation, maintenance and rehabilitation; except for expenditures assigned by the Secretary of the Army to governmental vessels in non-commercial service. Other items of local cooperation as recommended by the Board would not be affected by this additional requirement. At October 1981 price levels the first cost of the project is estimated at $407,016,000, of which $36,057,000 would be for traditional items of non-Federal cooperation and $370,959,000 would be for Federal construction costs, the latter being subject to the July 1981 cost recovery provisions. At the current interest rate of 7-5/8 percent the benefit to cost ratio is 1.5.

J. K. BRATTON
Lieutenant General, USA
Chief of Engineers

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

DEPARTMENT OF THE ARMY
BOARD OF ENGINEERS FOR RIVERS AND HARBORS
KINGMAN BUILDING
FORT BELVOIR, VIRGINIA [illegible]

REPLY TO
ATTENTION OF:

BERH-PLN

18 March 1981

SUBJECT: Mobile Harbor, Alabama

Chief of Engineers
Department of the Army
Washington, DC 20314

Summary of Board Action

The Board finds that navigation improvements in the Mobile Harbor, Alabama, area are advisable. The improvements are needed and, on balance, are economically, engineeringly, and environmentally feasible and are socially acceptable. The Board concurs with the reporting officers' plan to widen and deepen Mobile Harbor channels. The channels would be generally deepened from 40 to 55 feet and widened from 400 to 550 feet. Material from initial dredging of the entrance channel and lower bay channel would be placed in the Gulf of Mexico. New work dredged material from the upper bay channel would be placed in a 1,710-acre shoreline disposal area adjacent to the Brookley industrial complex. All material dredged during maintenance of the existing and proposed project would be transported to the Gulf of Mexico for disposal. The total first cost of the project is estimated at $363,400,000. The non-Federal portion of the cost is estimated at $50,400,000, which includes a cash contribution by the State of Alabama of 5 percent of the total project cost. The benefit-cost ratio is 1.6.

Summary of Report Under Review

1. Authority. This report is in response to a resolution adopted 24 June 1965 by the United States House of Representatives Public Works Committee. The resolution authorizing the study is quoted in the District Engineer's report.

2. Description of the study area. The focus of the study is on the existing Federal navigation project at Mobile Harbor extending from the entrance channel in the Gulf of Mexico to the mouth of Mobile River. The study area is located in the extreme southwest corner of Alabama. It includes Mobile and Baldwin Counties and

Mobile Bay. The southern borders of Mobile and Baldwin Counties lie on Mississippi Sound and the Gulf of Mexico, and contain all of Alabama's coastal area. Mobile Bay and its northern delta divide Mobile and Baldwin Counties. The City of Mobile is on the west bank of the Mobile River near its mouth. The 1974 population of Mobile and Baldwin Counties was approximately 334,000 and 66,000, respectively.

3. Economic development. Principal products handled through the Port of Mobile include iron and aluminum ores, coal and lignite, basic chemicals, crude petroleum, soybeans, sand, gravel, and crushed rock. Since 1951, total commerce at the Port has increased at a rate of about 6 percent annually. Commerce moving in deep-draft vessels through the Port of Mobile amounted to 17,300,000 tons in 1978.

4. Existing improvements. The existing Federal deep-draft navigation project is about 41.7 miles long and consists of the following major elements:

a. A 42- by 600-foot channel about 1.5 miles long across Mobile Bar.

b. A 40- by 400-foot channel about 30.6 miles long in Mobile Bay to the mouth of Mobile River.

c. A 40-foot deep channel about 4.6 miles long in Mobile River to the Cochrane Highway Bridge, the width varying from 500 to 775 feet.

d. A 25-foot deep channel about 3.0 miles long from Cochrane Bridge into Chickasaw Creek, the width varying from 500 feet in Mobile River to 250 feet in Chickasaw Creek.

e. Two turning basins in Mobile River opposite Alabama State Docks and Three Mile Creek, respectively.

Additionally, the Theodore Ship Channel is under construction to provide access from the main Mobile Bay Channel to the Theodore Industrial area. The Theodore Ship Channel Project includes: (1) a 40-by 400-foot channel, about 5.3 miles long, to the west shore of Mobile Bay; (2) a 40- by 300-foot channel, about 1.9 miles long from shoreline inland to a turning basin; and (3) a 12- by 100-foot barge channel extending inland from the turning basin for a distance of 6,000 feet.

5. Problems and needs. There is a need for improving the deep-water channels serving Mobile Harbor. Based on present trends to larger size bulk cargo vessels, economic efficiency can be realized by transport of bulk cargo in deeper-draft vessels. World demand for coal, particularly steam coal, is expected to increase substantially in the future. Projections of export coal through Mobile Harbor are similarly expected to increase substantially. Therefore, the number of vessel trips with loaded drafts requiring depths exceeding the existing channel depths will increase.

6. Improvements desired. Local interests have requested navigation improvements to accommodate large vessels transporting coal, iron ore, and other bulk commodities.

7. Alternatives considered. To meet developmental and environmental quality objectives, following alternative structural and nonstructural plans were considered in the plan formulation and evaluation process along with a no-action alternative:

a. Deepening existing channels serving the Port of Mobile and to the Theodore industrial area to depths of 45, 50, 55, or 60 feet.

b. A widening only plan for the main ship channel in Mobile Bay.

c. A plan providing for offshore transshipment terminals for handling liquid and slurry bulk commodities.

Alternative disposal plans for new work and maintenance dredged material encompassed disposal in the open waters of Mobile Bay to removal of material from the Bay estuarine system for disposal in either upland areas, diked or bulkheaded facilities located in Mobile Bay, or to Gulf of Mexico disposal areas. An open water disposal plan, whereby all new work and maintenance material from channel enlargement would be deposited along existing channels in Mobile Bay, was found to be least expensive of all disposal plans investigated. However, this plan was dismissed as being entirely unacceptable from an environmental standpoint. An upland disposal plan, whereby new work and maintenance dredged material would be pumped to diked upland sites, was also dismissed because of socioeconomic effects associated with the large land area required for storage purposes as well as adverse environmental effects associated with introduction of marine waters to upland, freshwater systems.

8. Plan of improvement. The plan selected by the District Engineer to best meet the navigation needs in Mobile Harbor

provides for deepening and widening existing channels. Material dredged initially for the proposed new work in the entrance channel and lower bay channel would be placed in the Gulf of Mexico. Material dredged initially from the upper bay channel would be placed in a 1,710-acre shoreline disposal area adjacent to the Brookley industrial complex. All maintenance dredged material for the existing and proposed project would be transported to the Gulf of Mexico for disposal. Major components of his selected plan are:

a. Deepening and widening the entrance channel over the bar to 57 by 700 feet, a distance of about 7.4 miles.

b. Deepening and widening Mobile Bay Channel to 55 by 550 feet, from the mouth of the bay to a point about 3.6 miles south of Mobile River, a distance of about 27.0 miles.

c. Deepening and widening an additional 4.2 miles of Mobile Bay Channel to 55 by 650 feet.

d. Providing a 55-foot deep anchorage area and turning basin in the vicinity of Little Sand Island.

e. Constructing a 1,710-acre dredged material disposal area adjacent to the Brookley industrial complex.

9. Economic evaluation. The District Engineer's estimate of construction cost (first cost) of the proposal is about $338,072,000, based on August 1980 price levels. The non-Federal portion of that cost, $42,578,000, would include a cash contribution from the State of Alabama of 5 percent of the construction costs. Annual charges and benefits are based on a 50-year period for economic analysis and a 7-3/8 percent interest rate. Annual charges are estimated at $32,613,000, of which $2,723,000 is for annual maintenance. The non-Federal portion of annual maintenance is estimated at $512,000. Average annual benefits, which are predominately transportation savings, are estimated at $52,803,000. The benefit-cost ratio is 1.6.

10. Recommendation of the reporting officers. The District Engineer recommends that the existing project for deep-draft navigation in Mobile Harbor, Alabama, be modified to provide for navigation improvements in accordance with plans described in his report and subject to certain items of local cooperation. The Division Engineer concurs.

Review by the Board of Engineers for Rivers and Harbors

11. General. The Board's review was conducted to assure that overall technical aspects of the proposals were engineeringly and economically feasible, environmental consequences of the project were not unreasonable, and that the proposals were in the general public interest. The study and report were examined to determine compliance with applicable administrative and legislative policies and guidelines and to assure that the study was conducted so that all interested parties had adequate opportunity for input and comment.

12. Responses to the Division Engineer's public notice. The Division Engineer issued a public notice on 6 November 1980 stating the recommendations of the reporting officers and inviting public comment to the Board. The comment period was extended to 9 January 1981 in response to a request. Eleven letters were received in response to the public notice. Six letters opposed the project on general environmental grounds or expressed specific opposition to the 1,710-acre Brookley dredged material disposal area. These letters were from the U. S. Environmental Protection Agency, U. S. National Marine Fisheries Service, President of the Mobile Bay Audubon Society, a Director of Mobile County Wildlife and Conservation Association and Alabama Wildlife Federation, and from a private individual. One letter in opposition comprised a petition signed by 12 local residents. The Board has considered the objections to the project, and its findings are presented herein.

13. A letter was also received from the General Manager of the Port of Chickasaw, Alabama, stating that there are significant omissions to the report regarding the upper portion of Mobile Harbor. The Port of Chickasaw, a private enterprise, dredged Chickasaw Creek Channel to a depth of 35 feet. The letter requested that this study address the need for assuming Federal maintenance of that channel and other needs in the upper harbor. The Board notes that the District Engineer, on two occasions during the study, informed Port of Chickasaw representatives of the need for an appropriate public entity to sponsor and to provide necessary local assurances for any modification. The Board believes that when an appropriate local entity is identified to provide assurances for Port of Chickasaw modifications, the needs can be addressed through the normal Corps General Investigations Program.

14. Alternative Plans.

a. Environmental quality plan.

(1) The reporting officers have not designated an Environmental Quality (EQ) Plan as provided for in the Water

Resources Council's Principles and Standards for Planning Water and Related Land Resources. The Board notes the interest of the U.S. Fish and Wildlife Service and other Federal agencies in the development of an EQ plan which would result in net beneficial environmental effects on Mobile Bay and its associated waterways.

(2) Determination of net environmental effects requires the weighing of both beneficial and adverse impacts of water resource development. Subjective judgment must, of necessity, be employed in this weighing process which in the case of Mobile Harbor is made particularly difficult by the large scale of the project and by the magnitude and diversity of the physical impacts involved. In evaluating planning alternatives, the reporting officers acknowledged the anticipated adverse effects of channel deepening and establishing the Brookley disposal area. Their evaluation also indicates potential ameliorating and compensating effects associated with recommended mitigation measures and various other environmental improvements to be studied prior to project implementation. The latter are identified in the feasibility report and include:

(a) Improving circulation in Mobile Bay by creating openings in existing ridges of dredged material which parallel the main ship channel from Dog River to the mouth of Mobile River.

(b) Filling natural depressions in Mobile Bay which are believed to contribute to adverse water quality conditions.

(c) Establishing a recycling plan to remove dredged material from existing Blakeley and Pinto Islands dredged material disposal areas.

(d) Establishing oyster beds in Bon Secour Bay which preliminary model studies indicate may be beneficially affected by the deepening project.

The reporting officers have not specifically recommended the foregoing measures for inclusion in the project at this stage of planning because their design and technical feasibility must be determined through model studies, and their cost-effectiveness further examined. The Board believes that the recommended fish and wildlife mitigation measures will be sufficient to offset anticipated adverse project effects on such resources. However, the Board concurs with the reporting officers that development of an EQ plan, which will make definite, positive contributions to the environment of Mobile Bay and its associated waterways, should be further pursued prior to project implementation.

b. Nonstructural plan. A primarily nonstructural plan was not carried forward to the final stage of planning. However, nonstructural measures were considered during the course of the study and found to be infeasible. The Board believes that the recommended plan properly meets the study objectives.

15. Brookley disposal area. The Board notes opposition to the Brookley disposal area by the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, and various local citizens and environmental interests. Opposition is based on the belief that this project feature would adversely impact wetlands which fringe the project area, commercial and recreational fisheries, esthetic values, and existing land uses along the Brookley waterfront. The considered Gulf Disposal Plan No. 1, which would avoid these adverse impacts by placing all construction dredged material in the Gulf of Mexico, is the alternative preferred by these Federal and local entities. Additionally, the Alabama Coastal Area Board has certified the recommended plan under provisions of the Coastal Zone Management Act of 1972, specifically conditioned on mitigation of adverse effects associated with the Brookley disposal area.

16. Because of the controversial nature of the Brookley disposal area, the Board has carefully examined the environmental and economic trade-offs between the respective dredged material disposal alternatives. The 1,710-acre site of the Brookley disposal area comprises 5 percent of the total shallow-water area of Mobile Bay, i.e., those areas less than 6 feet deep which are generally considered important to the production of shrimp and other estuarine dependent species. While past dredged material disposal, sanitary waste disposal practices, and natural sedimentary processes have adversely affected the ecological integrity of this sector of the Bay, it does possess moderate recreation and commercial fishing values which must be properly considered in project formulation, including the development of necessary mitigation measures.

17. In this regard, the Board finds that the anticipated adverse impacts resulting from establishment of the Brookley disposal area can be offset by planned and potential environmental mitigation measures identified in the feasibility report. Among these are:

a. Gulf disposal of all maintenance dredged material over the life of the project (the present unconfined disposal of maintenance material in Mobile Bay, plus associated mudflows, subjects large expanses of the Bay to recurrent stress because of regular dredging requirements).

b. Restoring circulation and improving water quality in the channel behind McDuffie Island by providing openings in the McDuffie Island causeway which has made this area a closed cul-de-sac.

c. Creating marshes adjacent to the southern boundary of Brookley disposal area to replace the estimated 70-acre loss of wetlands presently fringing the shoreline in that area.

d. Restoring tidal action to Chacaloochee and Big Bateau Bays by providing openings in the Mobile Delta causeway.

The latter measure would restore natural estuarine processes which were curtailed when Chacaloochee and Big Bateau Bay (total area 2,400 acres) were physically separated from Mobile Bay proper upon construction of the causeway in 1928. The cost of measure (d), which is not part of the reporting officers' specific recommendation, is estimated at $430,000. The total cost of all recommended mitigation elements is about $2,900,000.

18. It is the view of the Board that the recommended environmental improvement measures provide an effective and efficient way to mitigate for loss of resource values and ecological damages due to establishment of the Brookley disposal area. However, other impacts associated with this feature, namely esthetic degradation and interference with existing land use patterns along the Brookley waterfront, are not readily capable of mitigation. Although much of the existing Brookley area is already dedicated to industrial purposes, use of the disposal site for harbor development purposes may not be compatible with the residential, educational (Brookley campus of University of South Alabama), and recreational uses which also take place there. While aware of opposition expressed by affected local citizens and organizations, and comments submitted by the President of the University of South Alabama, the Board notes that the recommended plan has been determined to be compatible with State, regional, and local plans. According to the reporting officers, Gulf Disposal Plan No. 1 would entail an additional first cost of about $100 million due to higher dredging and haulage costs involved with total Gulf disposal. Furthermore, elimination of the Brookley disposal area would result in economic opportunities foregone due to land enhancement estimated to be about $2,700,000 annually. After weighing the overall environmental impacts of considered alternative dredged material disposal plans against their financial and economic costs, the Board concludes that it is in the public interest to adopt the reporting officers' selected disposal plan.

19. Benefit analysis. Commodity projections for deep-draft movements of iron ore, coal imports, and metallurgical coal

exports were derived essentially from studies and data available in 1975. Based on more current information, it appears that future demand for these commodities will be lower than estimated in the feasibility report. Conversely, the report analysis does not reflect the substantial growth in worldwide demand for steam coal which has developed in recent years in response to spiraling increases in world petroleum prices. Accordingly, the Board requested the reporting officers to reassess the projected commerce and to provide a reevaluation of navigation benefits taking into account information developed in 1980 by the President's Interagency Coal Export (ICE) Task Force and other sources pertaining to the future outlook for steam coal exports. The Board also requested updated information concerning plans by local interests for new or expanded bulk commodity handling facilities to accommodate deep-draft vessels.

20. The reevaluation made by the reporting officers included recontacts with prospective shippers and port interests. Also, reevaluated projections do not assume diversion of commodities from other ports because of the recommended project. Based on this reevaluation, the Board believes the following revisions to be appropriate.

a. Projected iron ore import tonnage likely to benefit from the proposed navigation improvements is estimated at 3 million tons annually. If present sources of ore supply remain unchanged, average annual benefits are estimated at $5,706,000. However, if current negotiations between U.S. importing interests and overseas suppliers result in longer ocean hauls because of changes in future sources of supply to more distant locations, transportation savings for iron ore are estimated at $10,940,000 annually.

b. Annual benefits of $3,098,000 for projected imports of steam coal contained in the feasibility report should be deleted. Companies involved in importation of coal through Mobile Harbor advise that present contracts may not be renewed upon expiration in 1986.

c. Projected growth in exports of metallurgical coal to Japan and other Far East destinations has been excluded in the benefit reanalysis because of current uncertainities regarding the long-range demand for United States exports to these areas. Annual exports of metallurgical coal to Italy, Europe, and South America are projected to remain constant after 1986 at 4.8 million tons, as shown in the feasibility report. Average annual benefits for metallurgical coal exports are reduced from $34,492,000 to $14,970,000.

d. Because of the increased world demand for steam coal, existing coal loading facilities on McDuffie Island are presently being expanded to provide annual throughput capacity of about 15 million tons. This facility is designed to accommodate bulk carriers larger than 100,000 dead weight tons. Local interests have recently announced plans to increase throughput capacity to 23 million tons by 1983 and further advise that sufficient area is available to double this capacity as the need arises. Modifications of bulk handling facilities located upstream of the I-10 highway tunnels will expand existing capacity in that area by 50 percent. Commodities which are expected to utilize this expanded capacity at upstream facilities are deleted in the benefit analysis because vessel drafts will be restricted by the 40-foot depth channel in Mobile River.

e. Based on current estimates provided by proprietary interests, contracts for 6.5 million tons of export steam coal through Mobile Harbor will begin in 1981 and increase to 10.4 million tons per year by 1985. All export coal tonnage is expected to be loaded at the McDuffie Island facility. Average annual benefits for currently estimated steam coal exports of 10.4 million tons are $30,938,000.

f. Computation of land enhancement benefits and the total contribution, as contained in the feasibility report, are based on outdated data. Recomputation of benefits using August 1980 price levels and 7-3/8 percent interest rates result in land enhancement benefits of $2,742,000 annually. Accordingly, 5 percent (the percent of land enhancement benefits to total benefits) of Federal construction cost has been assigned to local interests. That cost, presently estimated at about $17,300,000, would be contributed in cash by the local sponsor.

g. Total average annual benefits, based on 1980 prices and the prescribed 7-3/8 percent interest rate, are summarized as follows:

	Feasibility Report 1/	Reanalysis	
Navigation benefits:			
Iron Ore imports	$12,472,000	$5,706,000 2/	$10,940,000 3/
Coal imports	3,098,000	-	-
Coal exports:			
Metallurgical	34,492,000	14,970,000	14,970,000
Steam	-	30,938,000	30,938,000
Total navigation benefits	$50,061,000	$51,614,000	$56,848,000
Land enhancement	2,742,000	2,742,000	2,742,000
Total annual benefits	$52,803,000	$54,356,000	$59,590,000

1/ Updated August 1980, Attachment No. 1 of Summary Report.
2/ Assumes 75 percent from Venezuela and 25 percent from Brazil.
3/ Assumes 100 percent from Brazil, 1995-2044.

21. Project costs. Unit dredging costs were reviewed using projects under construction as a basis for comparison. The dredging costs are generally reasonable; however, costs for dredging the upper bay channel should be increased from $1.21 to $1.45 per cubic yard. Additionally, modifications of existing berthing facilities will be necessary to accommodate the 55-foot channel. The costs of those modifications, which would be a local responsibility, is estimated at $4,000,000. With cost adjustments made as part of the Board's review, revised estimated first costs and annual costs are as shown on page 12. Non-Federal costs include a contribution from the State amounting to 5 percent of project costs.

22. Diking costs. There are some differences in the report regarding the amount of material and the cost of necessary retaining dikes for the Brookley disposal area. The increased cost of dike construction, a local responsibility, was based on the difference in the cost of dredging so as to contain the material in the disposal area and the cost of dredging and disposal without the need for containment. That difference is estimated at 0.5 percent of the cost of dredged material to be placed in the disposal area. Therefore, the costs to be assigned to local interests for dike construction is estimated at about $460,000.

23. Revised total costs, based on 1980 prices, and average annual costs, based on 50-year period for economic analysis and a 7-3/8 percent interest rate are as follows:

	Federal	Non-Federal	Total
First costs	$313,000,000	$50,400,000	$363,400,000
Annual costs	29,800,000	5,000,000	34,800,000
Benefit-cost ratio	1.6		

24. Cost sharing. The Board notes that the Governor of Alabama declines to participate in the recommended cost sharing, which requires the State to provide a cash contribution of 5 percent of the project first cost. He believes that since the President's 1978 proposed cost-sharing policy has not received Congressional approval, it is contrary to existing law. The Governor declines to participate in the recommended cost-sharing until such time as this policy issue is clarified by the Congress. The Alabama State Docks Department, as local sponsor of the project, is generally agreeable to the recommended local cooperation that it would be required to fulfill, including a cash contribution for special local benefits deriving from land enhancement due to landfill. The Department also concurs with the Governor's views regarding additional cost sharing by the State of Alabama.

25. Findings and conclusions. The Board of Engineers for Rivers and Harbors concurs generally with the views and recommendations of the reporting officers. The report essentially complies with applicable policies and guidelines, and the items of local cooperation are reasonable. The recommended plan is technically sound and economically justified. There are expected to be some adverse environmental effects of the project. However, those effects, most of which will be mitigated as part of the plan, do not outweigh the added cost of a total Gulf disposal plan for the new construction.

26. Recommendation. The Board recommends that the existing project for Mobile Harbor, Alabama, be modified generally in accordance with the plan of the reporting officers, with such modifications as in the discretion of the Chief of Engineers may be advisable, and with the President's 1978 proposed cost-sharing policy. The estimated first cost to the United States for implementation is $313,000,000. This recommendation is made with the provision that, prior to implementation, State and local interests will, in addition to the general requirements of law for this type of project, agree to comply with the following requirements:

a. The State of Alabama will provide a cash contribution equal to 5 percent of the total first cost of the project;

b. Local interests will:

(1) Provide without cost to the United States all lands, easements, and rights-of-way necessary for implementation and maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and later disposal of dredged material, and including necessary retaining dikes, weirs, bulkheads, and embankments therefor, or the costs of such retaining works;

(2) Hold and save the United States free from damages due to construction and later maintenance of the project, not including damages due to the fault or negligence of the United States or its contractors;

(3) Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities, and other structures and improvements made necessary by the construction;

(4) Provide and maintain without cost to the United States adequate depths in vessel berthing areas and local access channels serving the terminals;

(5) Prohibit erection of any structure within 175 feet of the project channel as authorized;

(6) Provide and maintain without cost to the United States adequate public terminal and transfer facilities open to all on equal terms;

(7) Provide a cash contribution based on the final first cost allocated to special local benefits deriving from land enhancement due to landfill; and

(8) Share in the cost of fish and wildlife mitigation feature, in the same ratio as the remaining costs of the navigation feature.

c. The Board further recommends that:

(1) Work may be accomplished in separable units or features and that the written agreement with non-Federal interests required by Section 221 of the Flood Control Act of 1970, Public Law 91-611, may be obtained in compatible increments; and

(2) Tidal action be restored to Chacaloochee and Big Bateau Bay by providing openings in Mobile Delta causeway.

FOR THE BOARD:

William R. Wray
WILLIAM R. WRAY
Major General, USA
Chairman

REPORT OF THE DISTRICT ENGINEER

FOREWORD

This feasibility report presents a recommended plan and detailed alternatives for navigation improvements at Mobile Harbor, Alabama. All plans are compared based on October 1978 cost and benefit data. The cost and benefits of the recommended plan have been updated to August 1980 price levels and construction time shown as four and one-half years. This information is available in attachment 1 of the Summary Report.

SUMMARY REPORT

MOBILE HARBOR, ALABAMA

FEASIBILITY REPORT

CHANNEL DEEPENING FOR NAVIGATION

INTRODUCTION

Dredging to provide a navigation channel in Mobile Bay and Mo River began as a result of enactment of the River and Harbor Act 20 May 1826 by the U.S. Congress. During the period 1826 to 1857, channel 10 feet deep was dredged through the shoals in Mobile Bay to the city of Mobile. Subsequently, further modifications to th channel were authorized and the original Federal project was enla by the addition of the Arlington, Garrows Bend, and Hollingers Is Channels within the bay, a channel into Chickasaw Creek from the Mobile River, and maintenance snagging in Three Mile Creek. The recent main channel modification to be constructed was authorized the River and Harbor Act of 3 September 1954 and provided a 40-fo depth and 400-foot width in Mobile Bay to the mouth of Mobile Riv and a 40-foot depth in Mobile River to the highway bridge, the wi varying from 400 to 775 feet. The Senate Public Works Committee 16 July 1970 and the House Public Works Committee on 15 December 1970, under provisions of Section 201 of the 1965 Flood Control A authorized a 40- by 400-foot channel, branching from the main shi channel and extending through a land cut to the Theodore Industri

Park. The Theodore Ship Channel was reauthorized in the Water Resources Development Act of 1976 and construction was initiated 23 October 1978 on the barge channel extension and 9 April 1979 on the deep draft channel. Recent changes in both vessel characteristics and commodity movements indicate that modifications to the harbor are necessary to maintain efficient, safe and economical operations. Hence, this study was undertaken to determine the need and justification for modifying the existing project. The study area is shown on Plate 1.

STUDY AUTHORITY

Responding to the problems cited above and recognizing the national economic importance of deep-draft ports and their facilities, the Public Works Committee, United States House of Representatives, adopted a resolution on 24 June 1965 requesting that the Board of Engineers for Rivers and Harbors determine the advisability of modifying Mobile Harbor.

SCOPE OF THE STUDY

This study considered the need for modifications to the existing Federal project at Mobile Harbor, including the authorized improvements for the Theodore Ship Channel, to accommodate present and prospective commerce. Plans were formulated to meet both identified navigation needs as well as other water-related problems. Through a screening process, the better plans were identified and associated costs and benefits therefor were estimated. An assessment was also made of the economic, environmental and social impacts of the alternative plans. Depth and detail of the study were commensurate with the level of consideration given to the particular plan and the objective of selecting the most suitable overall plan and determining its feasibility and acceptability. The existing Federal project, detailed alternatives and the recommended plan for improvement are shown on Plates 1 through 5.

STUDY PARTICIPANTS AND COORDINATION

The Corps of Engineers was responsible for the conduct and coordination of the study, the formulation of plans, and the preparation of this feasibility report. The study was coordinated with appropriate Federal, State and local agencies, including the U.S. Fish and Wildlife Service, Environmental Protection Agency, National Marine Fisheries Service, Alabama State Docks Department, Alabama Development Office, Alabama Coastal Area Board, Alabama Department of Conservation and Natural Resources, and the South Alabama Regional Planning Commission. The District Engineer formed the Mobile Harbor Advisory Committee. This committee represented the varied interests in the local area and offered an objective review of data and study results. In addition, public meetings were held on 25 April 1967, 22 January 1974, 12 November 1975, 22 November 1976, and on 31 July 1979 to give interested parties an opportunity to express their views and opinions regarding the proposed modifications. Additional workshop meetings were held with interested Federal and State agencies and individuals to address specific study needs and issues as they arose. Also, a technical committee was formed in June 1971 of State and Federal agencies to analyze dredging in Mobile Bay and conduct a baseline environmental study. Their final report was published in July 1973.

OTHER STUDIES

Ten reports have been prepared on Mobile Harbor. The first was printed as House Document Number 1763, 64th Congress, 2d Session. The following reports are the most recent ones, beginning with the report that recommended the existing Federal project dimensions.

The report published as House Document Number 74, 83rd Congress, 1st Session, recommended modification of the existing project to provide a 42- by 600-foot channel about 1.5 miles long across Mobile Bar; a 40- by 400-foot channel in Mobile Bay to the mouth of Mobile River; a 40-foot channel in Mobile River to the Cochrane Bridge, varying in width from 500 to 775 feet; and several branch channels, turning basins and anchorages. The improvement was authorized by the River and Harbor Act approved 3 September 1954. The improvements were completed in 1965.

As noted earlier, studies to consider additional Federal modifications for Mobile Harbor were authorized in 1965. At the request of local interests to expedite consideration for Federal development of the Theodore Ship Channel, the Chief of Engineers authorized an interim report limited to consideration of those improvements on 6 March 1968. Pursuant to an interim report recommendation, Senate Public Works Committee on 16 July 1970 and the House Public Works Committee on 15 December 1970, under provisions of Section 201 of the 1965 Flood Control Act, authorized a 40- by 400-foot channel, branching from the main Mobile Bay Ship Channel and extending through a land cut to the Theodore Industrial Park with an anchorage area at the shoreline. During preconstruction planning for these improvements, a shoreline turning basin and a 6000-foot barge channel extension were also included in the plan for improvement. The modified plan was reauthorized by the Congress in October 1976 and construction is currently being performed.

THE REPORT AND STUDY PROCESS

This report has been arranged as a main report with five appendixes. The main report is a nontechnical presentation of the feasibility study for considered modifications and includes a description of the study area; a discussion of the problems and needs; the formulation of plans for satisfying those needs; a summary of economic studies showing the benefits, costs and justification; a delineation of plan responsibilities in terms of Federal and non-Federal contributions; a summary of environmental, social and economic impacts; and recommendations for implementing the selected plan. Appendixes 1 through 4 present the Draft Environmental Impact Statement, the Section 404(b) Evaluation, the pertinent correspondence which represents the Public Views and Responses, and the Fish and Wildlife Coordination Act Report, respectively. Appendix 5 presents the technical support data for material discussed in the main report.

PROBLEM IDENTIFICATION

The problems and needs examined relate to Mobile Harbor's ability to efficiently handle the present and future deep-draft commerce of the tributary area without unacceptable adverse impacts upon the surrounding environment.

NATIONAL OBJECTIVES

The "Principles and Standards for Planning Water and Related Land Resources" requires that Federal and federally assisted water and related land planning be directed to achieve National Economic Development (NED) and Environmental Quality (EQ) as equal national objectives. NED is to be achieved by increasing the value of the nation's output of goods and services and improving national economic efficiency. EQ is to be enhanced by the management, conservation, preservation, creation, restoration, or improvement of the nation's natural and cultural resources and ecological systems.

EXISTING CONDITION (PROFILE)

The development, economy and the natural and human resources of the area comprise a profile of existing conditions without any considered Federal improvements. These profile data are discussed in the following paragraphs.

Principal Industries and Activities. The economy of the Mobile area is based on its port and port-related activities, its natural resources and their use by industry, and the growing noncommodity-producing, service-oriented industries. In 1974, an estimated 18,000, or 13 percent of the total work force of the Mobile area, were employed by manufacturing industries closely allied with or dependent upon the port and related waterways. An additional 2,800 persons were employed in water transportation and transportation services which were directly related to port- and waterway-associated activities. A large percentage of the 3,000 employees involved in railroad, motor freight, and warehousing activities work at jobs connected with the port and waterways.

Total employment within Mobile and Baldwin Counties grew slightly during the decade from 1960 to 1970 from 121,400 to 123,100. These figures reflect the impact on the area of the phaseout of Brookley Air Force Base in the mid-1960's. In 1970 the wholesale and retail trade sector employed the greatest numbers, 25,400, closely followed by the manufacturing industries with 24,700 workers. The government was the third most important employer with 17,200 employees. The remaining industries employed 32,700 persons.

The Alabama Development Office has published data which announces investments by new and expanding industries in the Mobile area. More than $714.3 million in estimated investment was announced for the years 1973-1975, Mobile County receiving $693.6 million and Baldwin County $20.7 million. The investments indicate a greatly increased relative importance of chemicals and allied products, which account for 82 percent of the study area's projected growth.

Employment and Income. In 1974, with employment at 151,900, the unemployment rate in the study area reached 3.7 percent versus a State of Alabama rate of 4.0 percent, and a national unemployment rate of 5.6 percent.

In 1970 the study area's per capita income was $2,501. Although this represents a 30-percent increase over the 1962 figures of $1,918, it was approximately $1,000 less than the national per capita income in that year. Based on estimated figures for 1976, the State and the study area continue to lag behind the nation for the period 1970-1976 in per capita income, but had surpassed the nation in rate of growth of income.

Transportation. A well-developed system of transportation is essential to an area's economic well-being. The study area is served by an integrated network of highway, air, rail, and water transportation facilities. The area's highway system consists of six U.S. highways, two interstate routes, and a secondary system composed of State and county roads. Commercial and private air transportation are available at the municipally owned Bates Field and Brookley Aerospace Center. The railroads providing transportation service in the area are the Illinois Central Gulf, the St. Louis-San Francisco, the Southern, and the Louisville and Nashville. The Alabama State Docks Terminal Railway connects these railroads to portside tracks, other marine terminal facilities, and industries near the Alabama State Docks.

The study area is also served by a well-developed system of waterways. Deep-draft facilities are provided by a channel extending from the entrance of the bay, northward into the Mobile River. Barge traffic in the area is accommodated by the Mobile-Tombigbee-Black Warrior system, the Mobile-Alabama-Coosa River system and the Gulf Intracoastal Waterway which extends east-west across the southern part of the bay. The Tennessee-Tombigbee River project is now under construction and is expected to be completed in 1986. It will connect a 16,000-mile inland water system, located in 23 states, with the Gulf of Mexico at the Port of Mobile.

Port of Mobile. The first Federal project for Mobile Harbor was authorized by Congress in 1826. Since that year numerous modifications and extensions to the harbor channels have been authorized and constructed. The completed portion of the project, authorized by the 1954 River and Harbor Act, is comprised of the following features:

- A 42- by 600-foot channel about 1.5 miles long across Mobile Bar.
- A 40- by 400-foot channel in Mobile Bay to the mouth of Mobile River.
- A 40-foot channel in Mobile River to the highway bridge, the width varying from 500 to 775 feet.
- A 25-foot channel from the highway bridge to and up Chickasaw Creek to a point 400 feet south of the mouth of Shell Bayou, the widths being 500 feet in Mobile River and 250 feet in Chickasaw Creek.
- A turning basin 40 feet deep, 2,500 feet long, and 800 to 1,000 feet wide, opposite the Alabama State Docks.
- A turning basin 40 feet deep, 1,000 feet wide, and 1,600 feet long opposite Three Mile Creek.
- A 27- by 150-foot channel from the mouth of Mobile River to and including a turning basin 250 feet wide and 800 feet long in Garrows Bend, and continuing thence to a turning basin 800 feet long and 600 feet wide opposite Brookley Field ocean terminal, thence a 27- by 150-foot channel along Arlington Pier to the Mobile Bay Channel.
- Maintenance by snagging Three Mile Creek from its intersection with the Industrial Canal to Mobile River.

Maintenance of the Federal project consists of discharging the material dredged by hydraulic pipeline dredge along both sides of the bay channel in Mobile Bay and transporting the material dredged from the entrance channel by hopper dredge to an EPA interim approved disposal area in the Gulf of Mexico. The dredged material for Mobile River is currently being placed in approved disposal areas adjacent to the river.

The Alabama State Docks operate 2 bulk terminals and 26 general cargo berths above the Bankhead and Interstate 10 Tunnels. It operates one bulk handling facility below the tunnels on McDuffie Island. With a 40-foot ship channel into Theodore, the Alabama State Docks is committed to provide a public deep-draft bulk terminal at the turning basin to accommodate the loading/unloading of liquid cargo and storage for products such as inbound crude oil, outbound petroleum products and other bulk liquids that might be shipped through the Port of Theodore by tankers. There are 10 private terminals and docks above the tunnels that handle cargo moving inbound/outbound by deep-draft vessels. The major operators of these private terminals are Amerada-Hess Oil Corp., Citmoco Service, Inc., Chevron Asphalt Company and Mobile Bulk Terminal, Inc. These terminals above the tunnels will not be affected by the channel improvement because of the limited depth of the tunnels. There are one public and three private bulk terminals below the tunnels used for docking deep-draft vessels and storage of cargo. No deep-draft vessel berths for handling general cargo are located below the tunnels.

The public general-cargo terminals occupy 6,000 feet of deepwater frontage on the west bank of the Mobile River beginning at the Bankhead Tunnel and extending to the Ideal Cement Company wharf, immediately north of Pier D. A total of 14,000 feet of deepwater berthing space for general cargo operations is available along the 26 berths. Terminals for handling dry bulk material being transported by deep-draft vessels are located on the west bank of the Mobile River, with the exception of a terminal for handling scrap iron which is located on the east bank of the river just south of Alabama Drydock and Shipping Company. One private terminal is located at the foot of Virginia Street which handles iron ore imports for reshipment to steel mills in Birmingham. The public grain elevator is located on Alabama State Dock property immediately north of Pier C. The Alabama State Docks

Department operates a bulk handling tipple and storage terminal which is located at the mouth of Three Mile Creek.

Bulk terminals for handling liquids are located on both banks of Mobile River within the harbor limits. Two oil terminals for handling crude oil are located at Magazine Point on the west bank of Mobile River just north of Three Mile Creek. Two other oil terminals are located on Blakely Island along the east bank of Mobile River. These latter two terminals are not major facilities for handling petroleum by tanker.

There are numerous other private and public facilities in Mobile Harbor that serve the port. These are dry and cold storage warehouses, open-storage areas, marine repair plants, towing companies, and the railroad companies discussed previously. The Terminal Railway, Alabama State Docks Department, performs switching service between the State Docks and industries along its rail lines to Chickasaw, Alabama. Connecting service with the line-haul carriers which serve Mobile is also provided by the Terminal Railway.

The Alabama State Docks Department is in the process of upgrading facilities at the grain elevator. This improvement will include the construction of a new truck dump and scales, a 40,000 bushel per hour elevator leg, a 40,000 bushel per hour grain cleaning system, and a digital weighing system. Combined, they will allow grain to move through the elevator at twice the present rate. A recently completed, $6.0 million annex to the elevator will double the throughput of grain from rail/truck/barge to ship. Other completed improvements include a dust control system, a leg scale conveyor, a new pit for unloading rail cars, and a belt system extending from the barge unloading dock to the headhouse. Since 1975, total expenditures for upgrading facilities at the grain elevator have amounted to $16.0 million. The Alabama State Docks Bulk Ore Material Handling Plant, commonly referred to as "The Tipple," is located on Mobile River and on the south side of the mouth of Three Mile Creek. This terminal has 13 acres of dry bulk storage with two ship berths. The annual throughput capacity of this terminal is estimated to be about 5.0 to 6.0 million short tons per year. The Alabama State Docks has under construction an expansion which will increase one of the unloading facilities to 1,500 tons per hour. Other improvements that have been completed include an upgrading of the structure and conveyor system, rebuilt docks, an upgrading of the power system, unloading towers, installation of dust control system, construction of new pile walls, extension of the conveyor system, and construction of new storage facilities. Total expenditures for this facility since 1970 total $12.8 million. The McDuffie Island Coal Terminal located south of the Bankhead and Interstate 10 Tunnels will, upon completion of facilities under construction, contain one ship berth and 70 acres of storage space. The facility is served by both barge and rail transportation. The annual throughput capacity of this coal terminal is estimated to be about 4.8 million short tons.

Commerce for Mobile Harbor for the 10-year period from 1966-1975 has shown a steady increase. The increase in internal barge traffic has been the most significant source of the increase. Foreign and coastwise traffic (deep-draft) have shown a somewhat less significant increase in commerce. The major increase in deep-draft movements has been in the export of coal and coastwise shipments of crude petroleum. Trips and drafts of vessels using the harbor during the 10-year period from 1966 to 1975, as reported in "Waterborne Commerce of the United States," are discussed in greater detail in Appendix 5.

Human Resources. Mobile Bay's location and the area's mild climate have contributed greatly to the region's long, varied history. In 1819 Alabama was admitted to the Union and Mobile was granted a city charter. In 1861 Alabama seceded from the Union and was known as

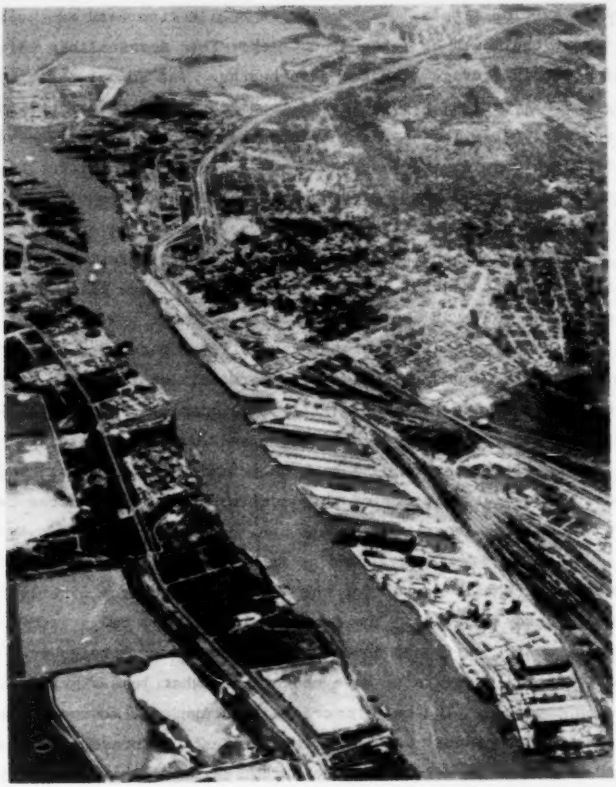

PHOTO COURTESY
ALABAMA STATE DOCKS DEPT.

FIGURE 1 - OVERALL VIEW OF TERMINAL FACILITIES AT THE PORT OF MOBILE

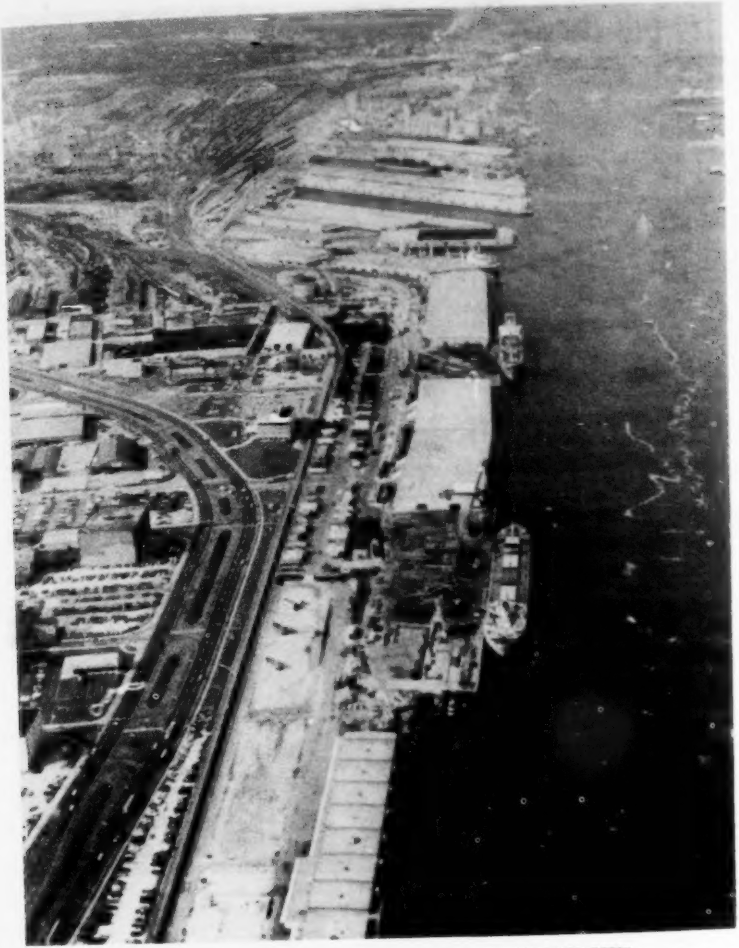

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FIGURE 2 - AERIAL VIEW OF GENERAL CARGO TERMINALS OWNED AND OPERATED BY THE ALABAMA STATE DOCKS

PHOTO COURTESY
ALABAMA STATE DOCKS DEPT.

FIGURE 3 - AERIAL VIEW OF THE PUBLIC GRAIN ELEVATOR
OWNED AND OPERATED BY THE ALABAMA STATE DOCKS

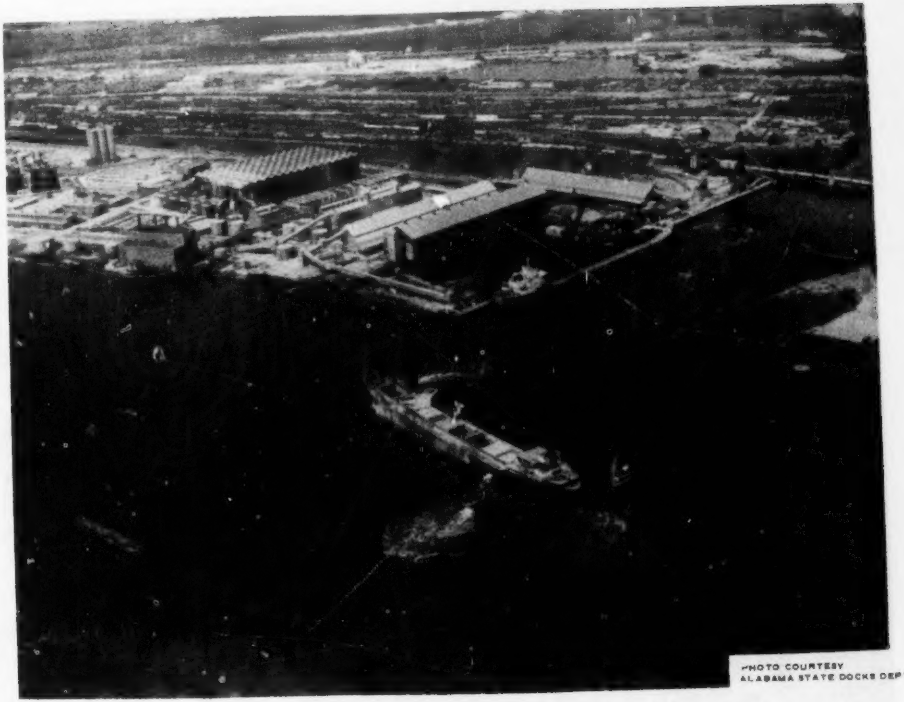


PHOTO COURTESY
ALABAMA STATE DOCKS DEPT.

FIGURE 4 - AERIAL VIEW OF THE BULK HANDLING PLANT (TIPPLE) LOCATED AT THREE MILE CREEK OWNED AND OPERATED BY THE ALABAMA STATE DOCKS

PHOTO COURTESY
ALABAMA STATE DOCKS DEPT.

FIGURE 5 - McDUFFIE ISLAND COAL TERMINAL LOCATED AT MOUTH OF MOBILE RIVER

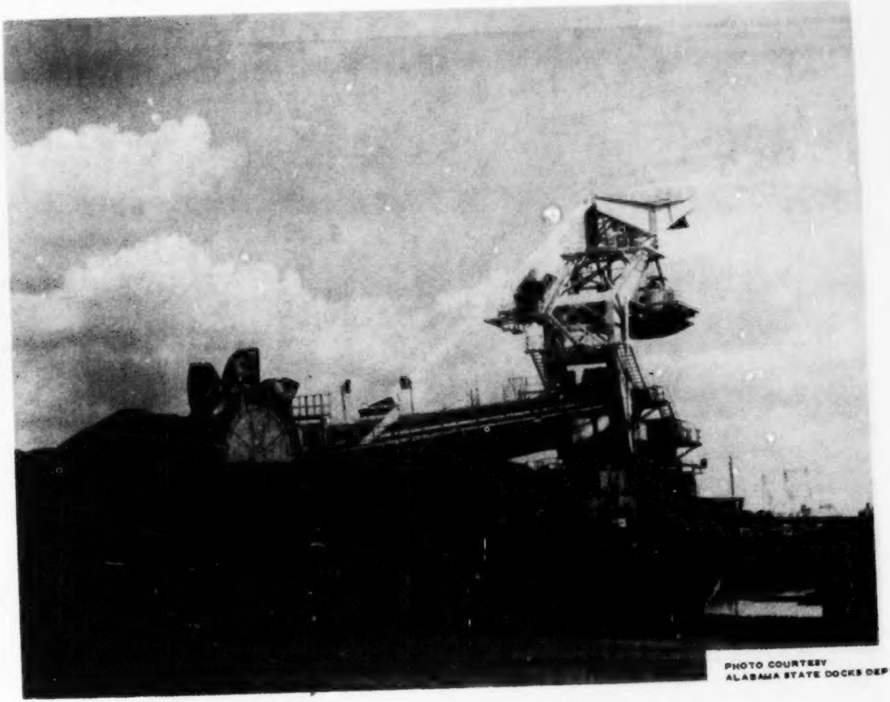


PHOTO COURTESY
ALABAMA STATE DOCKS DEPT.

FIGURE 6 - STACKER-RECLAIMER USED TO TRANSFER COAL FROM RAIL/BARGE TO SHIP AT McDUFFIE COAL TERMINAL

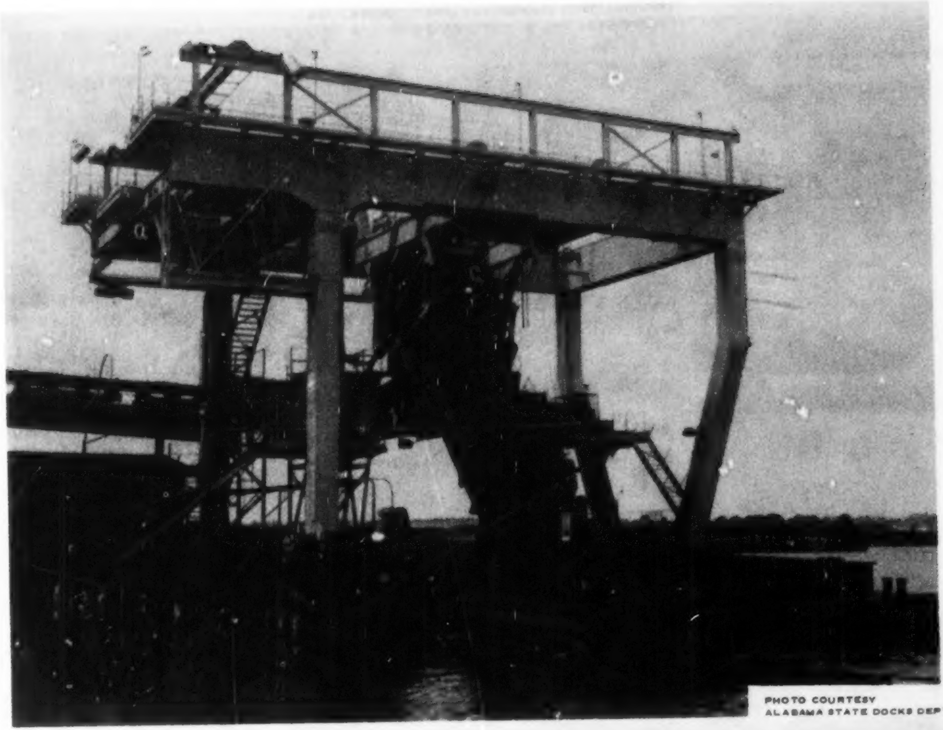


PHOTO COURTESY
ALABAMA STATE DOCKS DEPT.

FIGURE 7 - BARGE UNLOADING FACILITY AT McDUFFIE COAL TERMINAL

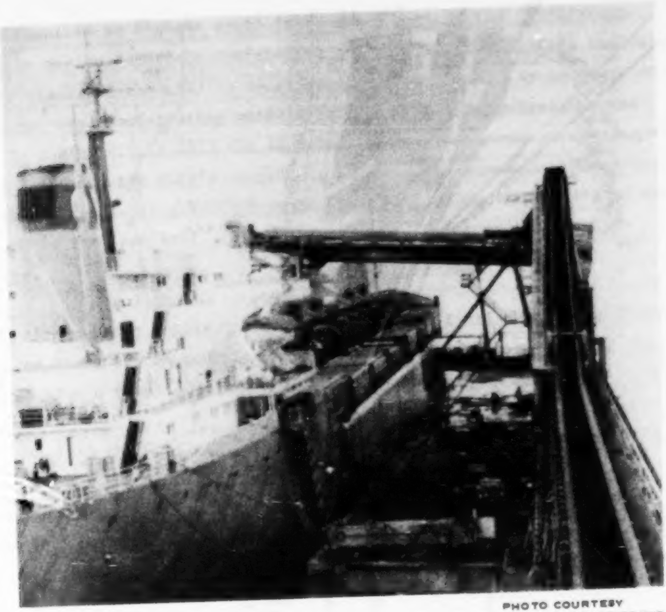
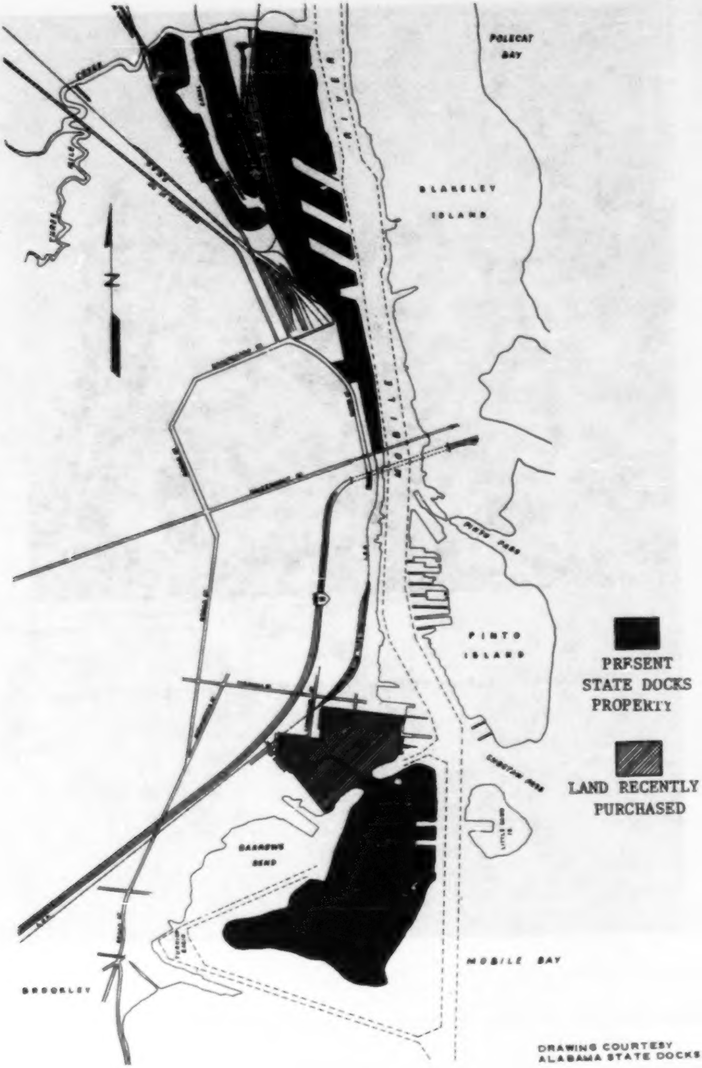


PHOTO COURTESY
ALABAMA STATE DOCKS DEPT.

FIGURE 8 - VESSEL LOADING COAL AT McDUFFIE COAL TERMINAL


POLECAT BAY
RIVER
BLAKELEY ISLAND
N
MOBILE
PINTO PASS
PINTO ISLAND
CHOCTAW PASS
GARROWS BEND
TURNING BASIN
MOBILE BAY
BROOKLEY
■ PRESENT STATE DOCKS PROPERTY
▨ LAND RECENTLY PURCHASED

DRAWING COURTESY
ALABAMA STATE DOCKS

FIGURE 9 - LAND RECENTLY PURCHASED BY THE ALABAMA STATE DOCKS TO BE USED FOR PORT EXPANSION

the Republic of Alabama until it became a part of the Confederacy. Mobile was an important Confederate post and for three years the Union Navy blockaded the city in an attempt to stop trade. By the turn of the century manufacturing activities had grown but agriculture was still dominant. In 1923 the Alabama State Docks opened at the port and increased the city's importance as a shipping center. Today the area is experiencing another surge of growth as the popularity of the South as the "sun belt" attracts residents, industry and tourists alike.

Although the Mobile Standard Metropolitan Statistical Area (SMSA) is comprised of two counties, Mobile and Baldwin, 52 percent of the study area's total population resides in the city of Mobile.

In 1970 the Mobile SMSA had a population of 376,690 of which 72.2 percent were white and 51.9 percent were female. Nearly half the population was under 25 years of age, 8.3 percent were 65 and over, and 42.8 percent fell between these two age groups.

Education in the study area is provided by a system composed of public and private schools. In addition to elementary and high schools, there are two colleges, one university, two junior colleges, and a mix of vocational, technical and training schools.

The education level of Mobile SMSA in 1970 closely parallels the State level; however, both lagged behind the nation for the age group, 25 years and older, that are high school graduates. In the study area data on educational achievement in the above age group shows that 34.1 percent completed elementary school, 27.2 percent completed high school, 7.8 percent attended one to three years of college and 7.7 percent completed four years of more of college.

Historically the bay has been a focal point for people living in the area. A question which draws interest and opinions from the region's citizens is how to best utilize and yet protect Mobile Bay. The business community is a force for economic development in the area and regards the bay as an economic asset to be developed. The environmental action groups warn that development without regard for the ecological ramifications could lead to the degradation of the bay and a loss for all interests.

Natural Resources. Mobile Harbor is at the mouth of Mobile River where it enters the northwest extremity of Mobile Bay. The city of Mobile, located about 150 miles east of New Orleans, is on the west or right bank of the Mobile River near its mouth.

Coastal Alabama lies within the Southern Pine Hills and the Coastal Lowlands subdivisions of the East Gulf Coast Section. The Mobile Bay estuarine system occupies 466 square miles, including the lower Mobile River Delta. The third largest runoff volume in the continental United States enters Mobile Bay from a drainage area covering 44,000 square miles.

The shape of Mobile Bay (L-shaped) is significant in regard to the movement of water and sediment by both tides and wind. The long axis of Mobile Bay, as a continuation of the upland river flood plain and delta distributing system, is significant in regard to movement of freshwater floods from the rivers. The 31-mile fetch is also important in regard to generation of waves by wind from either the north or south. The restricted outlet into the Gulf of Mexico between Dauphin Island and Mobile Point (3 miles in width) exerts significant control on the movement of water and sediment by both wind- and tidal-generated currents.

Incoming tidal waters enter through the main pass between Dauphin Island and Mobile Point peninsula. The current is deflected to the east of the entrance and then gradually swings back to the west, finally flowing northward with the development of eddies in Bon Secour Bay. In the northern end of the bay, the river flow from the Mobile-Tensaw River system is deflected to the western side of the bay and continues to move down the bay even during flood tide. The circulation pattern is much simpler at ebb tide. The water in the entire bay moves predominantly south in a general clockwise circulation.

The tidal cycle in Mobile Bay is diurnal, usually with one high and one low tide in a 24-hour period. The mean diurnal tidal range in the bayous and inlets along the Alabama Coast varies from 0.6 to 1.8 feet. The mean tidal height in Mobile Bay varies from 1.5 feet at the head of the bay to 1.2 feet at the entrance. Since Mobile Bay is long and fairly wide, the tides are often overcome or accentuated by local winds.

Mobile Bay is 31 miles in length (not including 12.6 miles of delta) and has an average width of 10.8 miles. Within the estuarine zone, including the lower Mobile Delta, are 6,224 acres of tidal marsh, 12,000 acres of freshwater lakes, 15,127 acres in bayous, rivers and connecting bays, and 249,343 acres in the bay itself. The average depth of Mobile Bay is 9.7 feet and the maximum is about 60 feet off Fort Morgan near the gulf entrance to the bay.

Salinities in Mobile Bay change rapidly over a wide spectrum, from 0 to 35 parts per thousand. Major fluctuations in river discharge have an immediate effect upon salinity in all parts of Mobile Bay, although, if short-lived, the effects are usually expressed mainly in the surface portions of the water column.

The geomorphic characteristics of the Mobile Bay estuarine system are due to the processes of sediment deposition and erosion that have altered the estuary during its 3,500-year history. An annual average of 4.7 million tons of suspended sediment and an unknown quantity of bed load are currently being transported into the estuary. About 1.4 million tons pass through the estuary and are deposited to the south and west of the tidal inlet. Most of the fine-grained sediment from the Mobile Bay system is deposited to the south and southwest of the tidal inlet in response to the predominant littoral drift. However, during the summer months, an eastward component of the littoral drift system causes some of the silts and clays to move eastward.

Physically, the surface layer sediments of the ship channels in Mobile Bay range from sand and silt to inorganic silts and clays, most having the latter classification. The deeper sediments are somewhat coarser-grained with the upper bay channel containing the larger amounts of sand. Analysis of these sediments, including physical, chemical, heavy metals, bacteriological, and pesticides concentration are discussed in detail in Appendix 5, Section B.

Ecology and Environmental Quality. Vegetation located below the 12-foot contour is a complex and diverse mixture of marshes, barrier island dunes, unconsolidated wetland and swamps, urban and industrial lands, and perennially submersed marine grass beds.

The vegetated barrier flats are most evident and best developed along the gulf side of Dauphin Island and Fort Morgan Peninsula. The area offers a valuable resting, nesting, and wintering habitat for migratory waterfowl and shorebirds.

Tidal marshes are most extensive in the Mobile Delta and the northern shore of Mississippi Sound. Species composition varies as salinity changes; i.e., the more brackish the water, the more salt-tolerant the plants. The brackish marshes are not only valuable as migratory waterfowl habitat, but also serve as a source of fixed carbon to surrounding waters, nutrient removal, and storm buffers.

The aquatic environment begins at the marsh with the major emergent estuarine plants and continues with areas of submersed vegetation. Submersed plants carry out several functions in aquatic environments including a food source for herbivorous animals and a place of refuge and source of food organisms for juveniles of many seafood species such as crabs, shrimp, and fishes.

The most sensitive areas to human disturbance in terms of diversity and abundance of commercially and aesthetically important invertebrates are the bay margins of the southern portion of Mobile Bay and Mississippi Sound; and the areas of highest oyster production, along the southwestern side of Mobile Bay. The area of least sensitivity would be the clayey bottoms of the bay centers and the upper third of Mobile Bay.

Mixing of the various water masses that enter Mobile Bay at regular intervals produces an infinitely varying combination of chemical and physical gradients. Generally, the bay's water temperatures range from about 10°C in January to about 31°C in August, while the average annual temperature is about 22°C. Bay salinities are generally low from January to May, ranging from less than 15 parts per thousand (0/00) in the lower bay to less than 5 0/00 in the upper bay. Summer and fall salinities range from 30 0/00 in the lower bay to 10 0/00 in the upper bay. A saltwater wedge extends from the mouth of the bay, up Mobile River and into Chickasaw Creek during most of the year.

Dissolved oxygen concentrations in the upper water column generally average about 7 mg/1. The lower limits of tolerance by aquatic organisms are sometime reached, resulting in "jubilees" which occur during the summer, mainly along the eastern shore. The water quality of the bay waters is, for the most part, of sufficient quality to meet the applicable water quality standards. Perhaps the most significant problem is that of bacterial pollution which causes periodic closure of the commercial producing areas.

CONDITIONS IF NO FEDERAL ACTION TAKEN (WITHOUT CONDITION PROFILE)

The without condition profile assumes the continuation of current trends and provides the base for the evaluation of future alternative impacts. Analysis of the no Federal action (No Action) alternative develops the no project impacts and effects upon the study area. Projections based on the "No Action" condition are presented in the following paragraphs.

Demographic Aspects. Without-channel modification projections for future growth in the study area indicate that the population of the Mobile SMSA will continue to increase from 377,439 in 1970 to 463,050 by 1995, and 502,500 by 2044. OBERS projections indicate that by the year 2000 the population in Mobile County will reach 388,700 and Baldwin County, 88,000. It is reasonable to expect that continued industrial growth in the study area will result in future population growth principally through immigration.

Regional Growth. Regional growth projections under present conditions for the SMSA are based on Series "E" national projections prepared by the Bureau of Economic Analysis. Employment and earnings by industry projections indicate continued economic growth under the "No Action" alternative and are summarized in Table 1. Total employment in the study area is projected to increase from 182,700 in 1995 to 204,800 in 2044. Earnings by industry are expected to increase

TABLE 1
PROJECTED POPULATION, EMPLOYMENT AND EARNINGS (1000's of 1967 Dollars) FOR MOBILE SMSA, 1995-2044

Item	1995	2020	2044
Total Population	463,050	502,500	502,500
Total Employment	182,700	204,800	204,800
Total Earnings	$1,925,450	$4,097,200	$4,097,200
Agriculture, Forestry and Fisheries	24,850	36,200	36,200
Mining	3,400	4,600	4,600
Contract Construction	141,200	269,600	269,600
Manufacturing	432,450	853,600	853,600
Transportation, Communication and Public Utilities	163,250	314,100	314,100
Wholesale and Retail Trade	320,400	615,600	615,600
Finance, Insurance and Real Estate	115,850	264,900	264,900
Services	419,300	1,056,300	1,056,300
Government	304,200	681,900	681,900

Source: 1972 E OBERS Projections: Regional Economic Activity in the United States and Population and Economic Activity in the United States and Standard Metropolitan Statistical Area (1972), Bureau of Economic Analysis, U.S. Department of Commerce.

from $1.9 billion in 1995 to $4.1 billion in the year 2044. In 1995 the manufacturing sector is predicted to produce the highest earnings, 22 percent of the total, while the trade and service sectors earn 17 and 21 percent respectively. By 2044 the services sector is projected to have the highest earnings (26 percent) followed by manufacturing (21 percent) and government (17 percent).

Community Growth. Planning for future growth is a major problem facing the Mobile SMSA. The South Alabama Regional Planning Commission (SARPC) has proposed certain goals as the ends towards which planned development may be directed. In summary these goals include: (1) a wide variety of suitable housing, (2) ample land and facilities to support economic growth, (3) protection, preservation, and enhancement of the regions' major physical and environmental features, (4) a permanent open-space system to provide recreational and agricultural areas and a reserve for the protection and conservation of natural resources, (5) an integrated regional transportation system, (6) land use based on physical characteristics and location significance, and (7) a sense of community identification and citizen participation in local and regional affairs. General goals for regionwide community services and human development have also been formulated.

If no Federal action is taken it is projected that future growth in the study area will occur within developed suburban districts, along major transportation facilities near urban areas, and close to existing development-generating activities. Economic specialization is expected to continue necessitating the development of specialized employees. This trend is particularly applicable to downtown Mobile which is predicted to continue as the area's center for finance, communications, government, and service-related activities.

National Economic Development. Projections indicate that the Mobile SMSA will maintain its role as the primary business activities center in the 12-county BEA region. Because of its location at the hub of an interstate highway, rail, and water transportation system, the city of Mobile is expected to retain its position as the wholesale trade center for the region. It is assumed that under the "No Action" the rate of growth for industries in the study area will at least equal or greater than the national growth rate.

Transportation. A comprehensive plan for the development of transportation facilities has been proposed for the study area by the SARPC. The estimated cost for implementing this plan has been set at over $1 billion, with highway facilities in the Mobile urban area accounting for more than 90 percent of the total costs. Mass transit systems are also being considered to relieve the ever-increasing traffic pressures placed upon the region's highways. The number of local commercial airline passengers is expected to increase tenfold between 1968 and 1995. To provide an adequate air transportation system for the area the expansion of the existing Bates Field Airport may be required, as well as the location of two additional airports in outlying areas. The Alabama State Docks has recently purchased 143 acres of waterfront property, rail lines, switching rights, and other facilities owned by the Illinois Central Gulf Railroad to facilitate better port-rail traffic conditions. The railroad rights-of-way and switching rights will be turned over to the Terminal Railway, which is also owned and operated by the State Dock. This action will open the McDuffie Island coal terminal equally to all railroads serving the area. It will also provide shippers with free and unobstructed access to all the existing and planned Mobile River terminal facilities.

Projected Waterborne Commerce. Annual commerce shipped through the Port of Mobile by deep-draft vessels has increased from 14.4 million tons in 1966 to 16.7 million tons in 1975. Barge traffic has increased from 7.9 million tons in 1966 to '5.8 million tons in 1975.

Upon completion of the Theodore Ship Channel (1982) 11.5 million additional tons of deep-draft commerce and 0.7 million tons of barge cargoes will be introduced into the harbor system. Assuming Federal action is not taken, it is reasonable to expect continued increase in deep-draft and shallow-draft cargo commerce as a result of economic expansion in the study area. Projections have been made for the annual volume of commerce moving in deep-draft vessels to the Port of Mobile. These data are shown in Table 2 and include projections for commerce expected to move over the Theodore Ship Channel, now under construction. It is estimated that the 1975 deep-draft tonnage, augmented by the Theodore tonnage, will increase to 59.5 million tons by 1995 and grow to 86 million tons by the year 2044.

Completion of the Tennessee-Tombigbee Waterway in 1986 will bring additional water-borne barge commerce to the study area. The waterway is projected to carry 28.1 million tons of commerce during 1986 and 34.6 million tons by 1993. Approximately 42 percent of the total traffic, or 11.8 million tons in 1986 and 15.2 million tons in 1993, will be imported or exported through the Port of Mobile. Expansion of terminal and barge handling facilities is expected to occur to meet the increased demand for these facilities.

Noise. Noise in the Mobile Harbor area results primarily from truck and automobile traffic and the operation of heavy machinery associated with loading and unloading at the docks. Since harbor activity is expected to increase without channel modification, it is assumed that noise levels will also increase. Completion of Interstate 10 across the bay lessens traffic noise. Traffic is flowing more evenly and the fact that the highway is elevated, and in an open space, aids in the dissipation of vehicular noise.

TABLE 2

ANNUAL VOLUME OF COMMERCE MOVING IN DEEP-DRAFT VESSELS THROUGH THE PORTS OF MOBILE AND THEODORE (1975-2044)
(Short Tons)

Commodity	Years								
	1975	1986	1995	2000	2010	2020	2030	2035	2044
				Commerce for Port of Mobile					
Iron Ore	4,781,000	5,291,000	5,856,000	6,264,000	7,292,000	8,400,000	9,595,000	10,475,000	10,475,000
Copper Ore	-	13,000	15,000	16,000	20,000	24,000	28,000	31,000	31,000
Bauxite	1,872,000	2,671,000	2,781,000	2,840,000	2,984,000	3,172,000	3,507,000	3,550,000	3,550,000
Alumina	-	684,000	939,000	1,081,000	1,409,000	1,836,000	2,285,000	2,524,000	2,524,000
Manganese Ore	45,000	188,000	223,000	243,000	286,000	337,000	392,000	423,000	423,000
Ferro-Phosphorus	44,000	59,000	79,000	89,000	124,000	175,000	252,000	302,000	302,000
Ferro-Silicon	-	22,000	26,000	28,000	32,000	38,000	45,000	48,000	48,000
Scrap Iron	133,000	349,000	403,000	433,000	490,000	553,000	622,000	658,000	658,000
Coal	3,116,000	18,287,000	20,208,000	21,451,000	21,451,000	21,451,000	21,451,000	21,451,000	21,451,000
Coke	55,000	74,000	98,000	112,000	155,000	218,000	315,000	378,000	378,000
Grain	1,989,000	3,740,000	5,442,000	6,518,000	6,815,000	7,136,000	7,476,000	7,652,000	7,652,000
Petroleum (Incl. Crude Oil)	2,701,000	3,605,000	4,544,000	5,067,000	6,261,000	7,739,000	9,574,000	10,770,000	10,770,000
Commerce thru Gen. Cargo Terms.	1,407,000	1,870,000	2,314,000	2,577,000	3,174,000	3,916,000	4,805,000	5,250,000	5,250,000
Subtotal	16,143,000	36,853,000	42,928,000	46,719,000	50,493,000	54,995,000	60,347,000	63,512,000	63,512,000
Misc. Commerce (3%)	536,000	1,105,000	1,288,000	1,402,000	1,515,000	1,650,000	1,810,000	1,905,000	1,905,000
Total for Port of Mobile	16,679,000	37,958,000	44,216,000	48,121,000	52,008,000	56,645,000	62,157,000	65,417,000	65,417,000
				Commerce for Theodore					
Manganese Ore	-	548,000	726,000	825,000	1,011,000	1,200,000	1,389,000	1,483,000	1,483,000
Ferro Alloys	-	54,000	71,000	81,000	99,000	116,000	133,000	142,000	142,000
Steel Billets	-	111,000	160,000	187,000	251,000	312,000	373,000	404,000	404,000
Cement	-	958,000	1,350,000	1,568,000	2,147,000	2,725,000	3,303,000	3,592,000	3,592,000
Refined Petroleum Products	-	1,129,000	1,445,000	1,620,000	2,129,000	2,639,000	3,149,000	3,404,000	3,404,000
Crude Oil	-	11,564,000	11,564,000	11,564,000	11,564,000	11,564,000	11,564,000	11,564,000	11,564,000
Total for Theodore	-	14,364,000	15,316,000	15,845,000	17,201,000	18,556,000	19,911,000	20,589,000	20,589,000
Total for Mobile and Theodore	16,679,000	52,332,000	59,532,000	63,966,000	69,209,000	75,201,000	82,068,000	86,006,000	86,006,000

Air Quality. Even if no Federal action is taken, the study area will continue to experience a level of growth. Therefore, the Division of Air Pollution Control, Bureau of Environmental Health, which monitors Mobile County's air quality, is presently developing an Air Quality Maintenance Plan for the county. The plan, which is mainly concerned with particulates, will cover the twenty-year period from 1975 through 1995, and will indicate the ambient air levels resulting from this increased growth. It will then determine what, if any, additional regulatory measures will be necessary. New industrial development in the county will be subject to stringent regulations and extensive studies will be required to insure that the standards will not be violated as a result of the new development. Since most of the study area's industrial growth is expected to occur in Mobile County, Baldwin County is not projected to experience serious degradation to its air quality. It is also expected that when final compliance with Federal automobile emission standards is achieved, there will be a substantial reduction in the photochemical oxidant level. Stringent controls of new industrial development will also be necessary to assure this.

Housing. With or without the considered improvement, the present pattern of residential development is expected to continue, with heavy growth areas to be located west of the city of Mobile and south to Theodore. The completion of Interstate 10 across the bay should result in Baldwin County becoming more attractive to residential development.

A survey conducted for the South Alabama Regional Planning Commission indicates that, while there is a high demand for apartments in the city of Mobile, the greatest demand is for single-family dwelling units. The Planning Commission has established a number of housing goals including special home-purchasing assistance to low-income groups, rehabilitation of substandard housing, and the stimulation of a rate of housing construction adequate for an expanding population and to alleviate existing overcrowding. The commission also hopes to prevent "urban sprawl" by encouraging residential growth in geographical groupings balanced by permanent open spaces.

Displacement of People. As previously stated, the Mobile Harbor area is expected to require additional dock facilities without regard to deep-draft navigation improvements in the Mobile Ship Channel. There is little residential development in the project area. Most of the existing houses are in a delapidated condition and are currently subject to urban renewal programs. Therefore, increased dock activity is not expected to affect the displacement of residential dwellings.

Aesthetic Values. Assuming no Federal action is taken, aesthetic values in the project area are expected to undergo changes as the region responds to the need for industrially developed land and expanded harbor facilities. This expansion can be expected to reduce the amount of open-space lands and to render the area less desirable for recreational activities.

Community Cohesion. A decision against Federal action regarding the requested improvements should not significantly affect future community cohesion in the Mobile SMSA. Certain groups within the region would be pleased with this decision while others would regard rejection of harbor improvements as a blow to the economic well-being of the study area.

History and Archeology. A decision not to implement the modifications to the Mobile Ship Channel now under consideration would not affect historical or archeological resources in the study since no new construction would take place.

Water and Land Use. As the population in the study area continues to increase, more land now used for other purposes will be converted to urban and built-up uses. This trend is expected to continue even with no additional harbor improvements. The bulk of new industrial development will probably occur as an extension of existing industrial areas in order to take advantage of existing power, water, highway, rail, or seaport facilities. Therefore, industrial growth is projected to expand primarily along upper Mobile Bay, north along the Mobile River, and south in the Theodore Industrial Park. Concomitant commercial development is expected to occur in the areas of residential development previously discussed.

Anticipated growth will create conflicting demands for the study area's fresh water resources. Much new industry is locating in the region to take advantage of this resource. Continued population growth will also require large amounts of fresh water.

Projected Recreation Uses. At present the general project area provides a variety of recreational opportunities, including hunting, fishing, swimming, boating, bird-watching, etc. Assuming no Federal action, projected industrialization and increased water-borne commerce is expected to claim further undeveloped land in the project area. Estuarine areas and wetlands along the bay may continue to be lost, reducing available wildlife habitat, resulting in a lowering of species diversity and population densities, and lessening recreational opportunities for the outdoorsman. Also, increased barge and deep-draft vessel traffic associated with economic growth and the Tennessee-Tombigbee Waterway may interfere with some water-oriented activities.

Environmental Effects. Some ecological trends occurring today can be expected to continue even without the structural modifications under consideration for the Mobile Ship Channel. The profile of existing conditions for Mobile Bay, outlined in Appendix 5, Section B, indicates that considerable environmental stress regularly occurs in the bay's estuarine and marine ecosystem. The two most obvious indicators of this condition are the "jubilees" and the annual closure of the bay to the harvest of oysters. However, such events have been recorded since early historical development in the Mobile area.

In the absence of changes to the existing project, future maintenance would continue to be performed according to current practice. On an average, approximately 3,824,000 cubic yards of sediments would continue to be removed annually from the Mobile Bay Channel and placed in open water on both sides of the channel along its entire length. Approximately 2,000,000 cubic yards of material would continue to be removed from the Theodore Ship Channel and placed in the Theodore island containment area. Approximately 225,000 cubic yards would continue to be removed from the bar channel and placed by hopper dredge over 4.4 square miles of open gulf bottoms. Approximately 1,150,000 cubic yards would continue to be removed from the river channel. Material from this reach is currently placed in contained areas adjacent to the upper harbor, however, future capacity is very limited. Severe environmental constraints tend to retard further development of upper harbor disposal sites into adjacent wetland areas. Plans to accommodate this future requirement are being developed by the project sponsor with technical assistance by the Corps of Engineers.

Disposal of material dredged from the bay channel will continue to disrupt the benthos within the disposal areas. Organisms include polychaete worms, nemertean, crabs, shrimp, mollusks, and echinoderms. Motile species normally either avoid or leave the disposal areas while the nonmotile forms are directly covered by the dredged material, mud flow, or heavy siltation within 1,200 to 3,500 feet from the disposal site. Since recovery of the benthos does occur, the total ecosystem loss resulting from this disposal technique has not been fully documented. Applicable studies to date indicate that it is a relatively minor impact well within the resiliency of the estuarine system provided that existing circulation patterns are not altered. The approximate community structure of the dredged and disposal areas is essentially fully reestablished within 9 to 18 months, after each maintenance operation. Since maintenance at any one reach repeats on a two-year cycle, significant recovery and utilization characterizes the disposal sites, prior to resumption of perturbation by dredging.

Maintenance dredging in the Mobile Harbor channels with disposal in open water also results in a temporary increase in turbidity. A study by Brett (1975) indicated that dredged material placed in open water stabilizes within a nine-month period and then becomes difficult to resuspend because of the high concentrations of clay particles. It was also concluded from the study that turbidity produced by dredging is transitory and lasts one to two days. This finding indicates a very short-term effect on light penetration and a consequent negligible effect on light-dependent plankton populations and sight-feeding fish. This effect is also minimized in Mobile Bay by the high natural state of turbidity.

Water quality is also affected by the high chemical and biochemical oxygen demands associated with finely sorted channel sediments. Resuspension of these sediments results in a temporary reduction in dissolved oxygen. The channel sediments contain moderately high concentrations of several trace elements. Windom (1973) concluded that dispersion of the sediments by dredging was not followed by metal release of any significant quantity, except possibly in the case of zinc and iron. It was further shown that variations in metal levels in the bay show no relation to dredging activities, but were more influenced by natural processes such as runoff. Increased levels of metals in the water column were found near the discharge end of the dredge pipeline, but were highly localized.

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In order to determine the potential release of contaminants in the dredged material into the receiving water column, the Corps of Engineers and the Environmental Protection Agency developed the elutriate test. It is designed to quantify the increase in concentration of a given constituent in the proposed receiving water (dilution water) after a sediment sample has been added vigorously to the dilution water, simulating the actual dredging conditions. In 1974 surface layer sediment samples were collected from 27 stations in the Mobile Ship Channel to assess the effects of maintenance dredging and disposal of the material. Physical and chemical characteristics of these sediments are discussed in Appendix 5, Section C. Elutriate analyses (see Appendix 5, Section D) performed on eight of the sediment samples indicated that the nutrient-related consituents, such as ammonia nitrogen, total Kjeldahl nitrogen, dissolved phosphorus, and total organic carbon most often demonstrated a potential to be released into the water column. It was concluded, from a nutrient standpoint, that the release of the constituents would not be expected to create adverse water quality conditions in unconfined areas of Mobile Bay. A scavenging trend was noticed for metals in most of the samples analyzed, resulting in lesser concentrations in the elutriate waters than in the dilution or background waters. Based on the results of the elutriate test, it was found that there would be an increase in the concentrations of copper cadmium, lead, nickel, and iron, but the increase would be limited only to the area of the immediate discharge.

The impact of disposal from the bar channel is similar to the open-water bay disposal. The primary difference is that the emptying of the hopper dredge within this area has resulted in a buildup of the sea bottom. The process generates large clouds of suspended solids upon deposition. The time required for the induced turbidity to dissipate has not been specifically documented, but it is considered to be less than one day. Solid material from the dumping action traps and smothers many organisms living in and traveling through the water column above the dumping grounds, as well as bottom organisms. Fish are frequently seen jumping from the water within the area of the turbid water. It is not known whether they are being pursued by larger predators and have sought cover within the turbid water or if they are jumping to avoid the increased turbidity.

Since both Sand and Dauphin Islands are presently experiencing some erosion problems, it is highly probable that the present maintenance project could be coupled with a beach nourishment program in the future. The principal impediment to the immediate implementation of such a program lies in the present lack of a sufficient number of hopper dredges which have pump-out capability. As more dredges with this capability become available, the material from the outer bar could be pumped into the littoral drift system of Sand and Dauphin Islands.

Two samples were taken along the bar channel during preparation of the Mobile Harbor Operation and Maintenance Environmental Impact Statement. The physical characteristics of both these samples are such that they are excluded from the requirement for elutriate analysis and are considered acceptable for open-water disposal. This material is characterized by a very high percentage of coarse sand with approximately 7% silts and clays. The silts and clays are responsible for the turbidity increases during the loading and unloading of the hopper dredge.

Disposal of dredged material along the Bay channel is thought to have modified circulation patterns in the bay (May, 1973). Jubilees are considered to be caused by salinity stratification in sinks created by shoals in the lower bay and by spoil banks from the ship channel. May reports that the natural shoaling and spoil from the channel have dammed most of the bottom water on the eastern side of the bay preventing its regular exchange with the gulf. Organic matter

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and woody debris accumulate in these sinks, and bacterial decomposition of this organic matter during summer when waters are stratified causes oxygen depletion in bottom waters of the sinks which, under certain conditions, may move shoreward causing a jubilee. The mortality caused by this phenomenon has not been assessed, nor has its impact on the trophic dynamics of the bay ecosystem been established. Recent surveys by the Corps suggest that the buildup of material alongside the channel is not as extensive as has been previously thought. There has been a buildup of material in the upper third of the bay west of the ship channel and to a lesser extent on the east side. Evaluation of the surveys reveals that the presently existing volume of material along the channel is less than the volume of material involved in initial dredging alone. Consequently, it is considered that the lighter maintenance material does not accumulate but is redistributed by wind, wave, and tidal action. Disposal operations in the lower bay have not resulted in a significant accumulation of the dredged material. The Mobile Bay Technical Committee Report (1973) concluded that the apparent existence of depressed dissolved oxygen conditions prior to the construction of the ship channel indicates that the present physical modifications to the bay are not the sole causes of existing water quality conditions. The contribution that the ship channel and disposal mounds makes on circulation patterns and water quality conditions is not well defined.

PROBLEMS, NEEDS AND OPPORTUNITIES

The problems and needs examined relate to Mobile Harbor's ability to efficiently handle the present and future deep-draft commerce of the tributary area and ways to enhance and/or minimize averse impacts upon the surrounding environment.

Public Concerns. A public meeting was held at Mobile, Alabama, on 25 April 1967, to afford local interests an opportunity to express their desires and to present their views and opinions regarding the advisability and justification for Federal participation in the improvements of navigation facilities for Mobile Harbor. The hearing was attended by 72 persons representing Federal, State, county, and local government agencies and other civic bodies, navigation interests, industry and local interests concerned with port development.

Proponents at the public meeting requested that the Federal project for Mobile Harbor be modified to include adoption and enlargement of the existing Theodore Channel to provide a channel 40 feet deep and 300 feet wide and that such channel be extended by land cut into a turning basin within the Theodore Industrial Park. Local interests further requested that the turning basin opposite Magazine Point in Mobile River be enlarged and that an anchorage basin of sufficient size to accommodate 12 large ocean-going vessels be provided near the mouth of Mobile River. Local interests also requested the Corps of Engineers initiate such studies as may be necessary to determine the engineering and economic feasibility of providing a 50-foot depth in the main Mobile Harbor channels. No opposition was expressed to improvement of the harbor, however, a request was made that all possible steps be taken to minimize adverse effects of dredged material disposal on fish and wildlife resources.

A second public meeting was held at Mobile, Alabama, on 22 November 1976 with over 140 persons in attendance. Alternative plans were presented for the disposal of dredged material, both for the new work and maintenance material which would result from the implementation of any channel improvement. All alternatives considered at this stage of the planning process were related to a 50-foot, deep-draft channel with commensurate widths, anchorage basins, turning areas, and auxiliary barge and access channels.

A considerable majority of those represented at the meeting were in favor of improvements for Mobile Harbor. State officials, representatives of shipping interests, and local citizens either spoke or wrote letters in favor of the project. However, several Federal and State agencies, environmental groups, and local citizens spoke or wrote letters expressing concern or opposition to several of the plans and certain dredged material disposal alternatives. Concerns included the necessity or desirability of deepening Mobile Ship Channel, the potential environmental degradation of the bay and environs and the possibility of invalidating the Mobile 208 studies being conducted to determine the optimum location of discharge points within the bay. The Environmental Protection Agency in general sums up the views of those opposed. This agency prefers that the dredged material be transported to an approved disposal site in the Gulf of Mexico. It also states that open-water disposal in the bay from both new work and maintenance dredging should be discontinued and that spoil island development and navigational channel improvements should be supported by data generated not only from a mathematical model but also from the existing physical bay model.

Resource Management Needs. The existing 40- by 400-foot navigation channel into Mobile Bay presents constraints to the efficient movement of commerce into Mobile Harbor and the use of larger, more economical vessels in this commerce. Currently, liquid and dry bulk carriers with dead weight tonnage ranging up to 88,000 tons, widths in excess of 128 feet and lengths in the order of 850 feet, and fully loaded drafts up to 43 feet are calling at Mobile Harbor. Because of the limiting channel depth of 40 feet, these large ships are calling at Mobile Harbor light-loaded with concomitant increased transportation costs. With improved channel depths and widths even larger vessels would use the harbor. There are also navigation problems and safety hazards associated with the channel widths, especially in the vicinity of McDuffie Island Coal Terminal.

At the present time there is a need for a turning basin in the vicinity of the McDuffie Island Coal Terminal. The Alabama State Docks Department dredged a turning basin on the east side of the channel approximately 27 feet deep, 800 feet long and 600 feet wide. The basin is adequate to turn light-loaded small vessels; however, the larger vessels must use a turning basin 2 miles up river opposite the Alabama State Docks.

Vessels calling at the Port of Mobile must wait their turn for their designated berth, at a terminal not in use, or anchor in the Gulf of Mexico. The lack of in-port anchorage areas prevents efficient utilization of the terminal's and hamper's overall port operations. The deficiency creates particular problems for the vessels awaiting berthing space at the liquid, dry bulk, or container terminals, that are too large to utilize unoccupied general cargo berths. An additional factor is the need for an anchorage as a matter of safety. There is currently no place in Mobile Harbor, away from terminal facilities, to anchor a ship that is broken down, or that presents a potential hazard or safety problem.

There are three main barge marshaling areas in Mobile Harbor at the present time. The two marshaling areas in the Mobile River are barely adequate to handle barge marshaling needs in that section of the port. The area in Garrows Bend at McDuffie Island must handle both loaded and unloaded barges. The area is presently estimated to be adequate for loaded barges while an area of equivalent size is needed for the marshaling and fleeting of empty barges. This area functions essentially in support of the McDuffie Island public coal terminal.

The current practice for disposal of dredged maintenance material from Mobile River is in diked disposal areas. Although objectionable to many interests, maintenance material from the Mobile Bay Channel is posited in open-water disposal areas along the channel within Mobile y. Due to environmental constraints preventing the use of wetland tes and due to industrial development, the areas for use as upland edged material disposal sites are severely constrained. At the esent containment areas only about sixteen additional years of intenance dredging disposal can be accommodated. In view of the portance of continued operation of Mobile Harbor, there is a essing, if not critical, need for a long-range disposal plan for edged maintenance material from the Mobile River.

Several natural processes are occurring which affect the quality f the environment of Mobile Bay. The most significant is the natural edimentation and filling of Mobile Bay. The inflow of sediment to he headwaters of the bay is greater than that which flows out of the ay to the gulf. Another natural process occurring on Mobile Bay is hat of shoreline erosion. The shoreline around the bay varies from ery stable to erosion rates in the order of magnitude of 10 feet per ear.

The alteration of Mobile Bay by man has also created environmental problems. The construction of the causeway across the northern bay and delta introduced a barrier to the free flow and circulation of bay waters in addition to the introduction of pollutants from developments along the upper part of the estuary.

The above resource management needs (problems and opportunities) and other related needs constitute the basis for the planning objectives addressed in this study to enhance National Economic Development or Environmental Quality.

PLANNING CONSTRAINTS

Legislative and executive authorities have specified the range of impacts to be assessed, and have set forth the planning constraints and criteria which must be applied when evaluating alternative plans. Plans must be developed with due regard to the benefits and costs, both tangible and intangible, as well as associated effects on the ecology, and social and economic well-being of the region. Federal participation in developments should also assure that any plan is complete within itself, efficient and safe, economically feasible in terms of current prices, environmentally acceptable, and consistent with local, regional, and state plans. Plans which recommend non-structural alternatives must be given equal consideration, and as far as practical, plans should be devised which maximize the beneficial and minimize the adverse effects of the considered improvements.

PLANNING OBJECTIVES

Establishing planning objectives involves analyzing the identified concerns regarding the use of water and related land resources in the study area to translate them into specific objectives for the study. The data developed will be analyzed as a basis for translating needs, opportunities, concerns, and constraints into the planning objectives of the study. These objectives will be set forth and described as specifically as possible so as to provide a meaningful guide and focus for subsequent formulation activities.

Specific planning objectives for this study derive from Mobile Harbor's need to more efficiently and safely accommodate the larger vessels desiring to call at the port. To fully achieve these ends it is necessary to widen and deepen the ship channels, and to provide additional turning and anchorage basins. Also sought is a long-range

cceptable solution for dredged material disposal from the Mobile Bay nd River sections of Mobile Harbor, the investigation of measures for horeline erosion protection, and measures to preserve and enhance the ater quality and related ecologic and recreational integrity of obile Bay.

The following planning objectives were applied in the first stage f the plan formulation process.

- **More efficient and safe movement of existing and projected ommerce by deep-draft vessels.**

- **Maintain and enhance environmental quality.**

- **Compliment regional goals for development of water and related and resources.**

FORMULATION OF PRELIMINARY PLANS

This section of the report contains a listing of the criteria used for plan formulation and evaluation, a discussion of the plan formulation methodology, a discussion of the plans developed by local interests, and a step-by-step development of preliminary plans to satisfy the need for deep-draft access to the Port of Mobile and to the Theodore Industrial Area, the need for a turning basin and anchorage area near the mouth of Mobile River, and the need for a barge marshaling area near McDuffie Island. The plans formulated during the preliminary planning stages are described and screened with a view toward determining which alternatives should be carried forward for further investigation.

PLAN FORMULATION RATIONALE

Federal policy on multiobjective planning, derived from both legislative and executive authorities, establishes and defines the national objectives for water resources planning, specifies the range of impacts that must be assessed, and sets forth the conditions and criteria which must be applied when evaluating plans. Plans must be formulated with due regard to benefits and costs, both tangible and intangible effects on environmental features and social well-being of the region, and with due regard to public acceptability and institutional capability for implementation.

Evaluation of alternative plans is aided by displaying in a system of accounts the effects on regional development and social well-being, along with effects on national economic development and environmental quality. The regional development account embraces several types of beneficial effects, such as increased regional income and employment, population distributions, diversification of the regional economic base, and enhancement of environmental conditions of special regional concern. The beneficial effects on social well-being are contributions to the equitable distribution of real income and employment and to other social objectives. The display of effects in the four accounts provides a basis for comparing alternative plans and for indicating the tradeoffs among them.

In addition to evaluating the effects of alternative plans in four accounts, plans are appraised in terms of a set of "specified evaluation criteria."

Acceptability. Significant public support or strong opposition will be evaluated.

Completeness. Investments and actions which are not part of the plan but which are necessary to obtain the plan's outputs will be considered.

Effectiveness and Efficiency. These two related criteria center on the concept of achieving maximum net outputs where outputs and inputs are conceived broadly to include intangible factors. Effectiveness includes, in addition, the concept of technological feasibility.

Certainty. The likelihood of obtaining contributions claimed under the four accounts mentioned above will be evaluated.

Geographical Scope. This criterion requires that areas impacted beyond the study area whose main problems may be solved by the plan be indicated.

NED Benefit/Cost Ratio. This ratio, indicating economic efficiency, is always considered and displayed.

Reversibility. The degree of reversibility will be stated.

Stability. A judgment will be made of each plan's stability.

Technical criteria applicable to the study of Mobile Harbor improvements include:

- Structural improvements to the existing project must be consistent with local, regional and state plans for land use and port expansion.

- Improvements should have dimensions adequate to accommodate expected user vessels and have available facilities or expansion potential to accommodate projected traffic and commerce.

- Authorized project dimensions should recognize the present Federal policy that requires local interests to maintain berthing areas outside the boundaries of the Federal project.

Technical criteria for the Mobile Harbor channels are discussed in detail in Appendix 5, Section D.

Established economic criteria insure that the selected plan will be the most economical way of meeting the planning objectives. Those applicable to this study are:

- The plan must have net national economic development benefits unless the deficiency is the result of benefits foregone or additional costs incurred to serve the environmental quality objective.

s plan, as ultimately formulated, should provide the maximum
fits possible within the framework of the formulated concept.

sts of alternative plans are based on current unit prices.

nefits and costs should be in comparable economic terms to the
extent possible.

nual benefits and costs are based on a 50-year (1995-2044)
tion period and the current discount rate of 6-7/8 percent, as
ed by the Water Resources Council, based on the cost of Fed-
g-term borrowing during the preceding 12 months.

eria for consideration of socioeconomic and environmental
are derived in part from values established in the National
ental Policy Act of 1969, Section 122 of the River and Harbor
d Control Act of 1970, Section 404 of the Federal Water Pollu-
trol Act of 1972, and Section 103 of the Marine Protection,
and Sanctuaries Act of 1972.

lans should be formulated to maximize the beneficial and
the adverse effects of the project on:

-made resources
er quality
lands
quality
thetics
sical characteristics of Mobile Bay and the Gulf of Mexico
g-term changes in Mobile Bay and the Gulf of Mexico
logical productivity of the bay and gulf area
ucture of biological communities
cies diversity
terns of commercial harvest of fish and shellfish

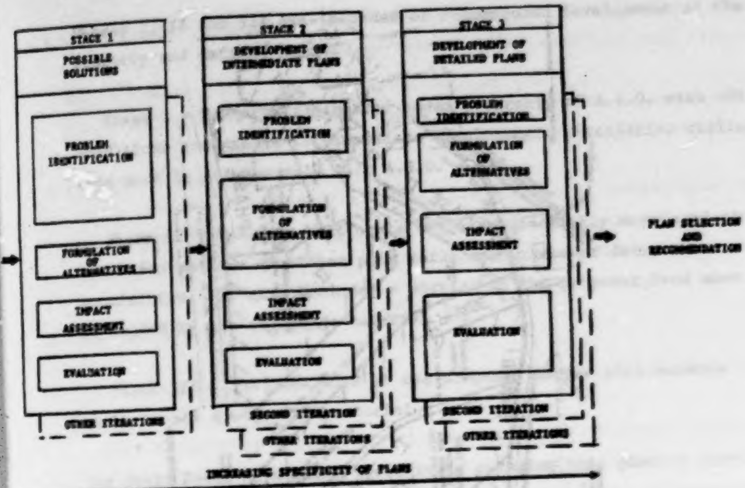
- Plans should minimize and, if possible, avoid:

Destruction of community cohesion
Injurious displacement of people
Disruption of desirable community growth
Undesirable alteration of recreation opportunities

- Consideration should be given to protection of historic, archeological and other public interest areas.

- Plans should not significantly increase noise pollution during construction or create conditions that will tend to raise the overall noise level of the area over the life of the considered improvement.

Plans were formulated within the framework of an iterative, three-stage process: (1) Possible Solution, (2) Development of Intermediate Plans, and (3) Development of Detailed Plans. Each stage is composed of the same four functional planning tasks and maintains the same sequence of task performance, although emphasis shifts with succeedin iterations. Formulation advances through the stages until only those alternatives that could be implemented remain under consideration. The formulation methodology is illustrated in Figure 10. In coordina tion with concerned state and local representatives and private inter ests, further, more detailed analyses were conducted of those plans carried over from the initial stages and endorsed by local interests. As a result of those analyses the selected plan was derived.


STAGE 1
POSSIBLE SOLUTIONS
PROBLEM IDENTIFICATION
FORMULATION OF ALTERNATIVES
IMPACT ASSESSMENT
EVALUATION
OTHER ITERATIONS
STAGE 2
DEVELOPMENT OF INTERMEDIATE PLANS
PROBLEM IDENTIFICATION
FORMULATION OF ALTERNATIVES
IMPACT ASSESSMENT
EVALUATION
SECOND ITERATION
OTHER ITERATIONS
STAGE 3
DEVELOPMENT OF DETAILED PLANS
PROBLEM IDENTIFICATION
FORMULATION OF ALTERNATIVES
IMPACT ASSESSMENT
EVALUATION
SECOND ITERATION
OTHER ITERATIONS
PLAN SELECTION AND RECOMMENDATION
INCREASING SPECIFICITY OF PLANS

GENERAL RELATIONSHIP OF PLANS FORMULATION STAGES AND FUNCTIONAL PLANNING TASKS.

Figure 10

PLANS OF OTHERS

A plan (see Figure 11) developed by a consulting firm hired by the State Docks Department was selected as the port expansion master plan. It features a realigned Arlington Channel and a parallel ship channel into the proposed land mass opposite Brookley, with areas in Garrows Bend and adjacent to the maintenance dredge material disposal areas available for barge marshaling. This expansion plan represents a continuous land mass consisting of McDuffie Island (expanded to 730 acres), to Garrows Bend/I-10 area (590 acres before detailed planning), and the proposed land mass opposite Brookley (approximately 2,340 acres) for a total proposed expansion area of 3,660 acres.

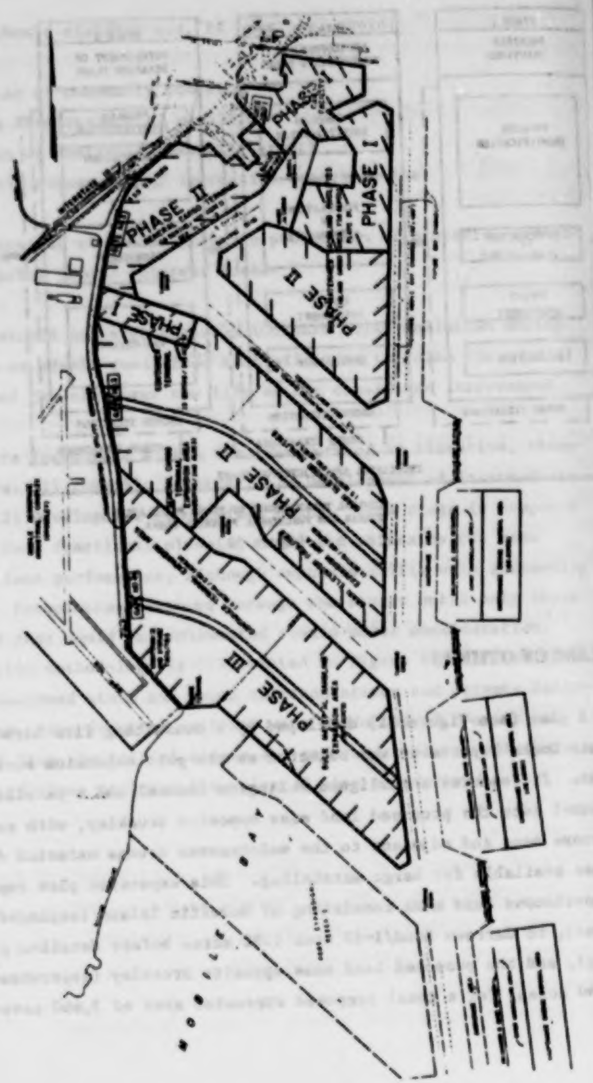

PHASE I
PHASE II
PHASE I
PHASE II
PHASE I
PHASE II
PHASE II
PHASE III

FIGURE 11 - Alabama State Docks Long Range Development Plan

Phases I, II and III are in order of recommended development of the property and defined below.

Phase I - Preferably property under ownership of A.S.D. with soils conditions acceptable for immediate development. Facilities utilization must be commensurate with A.S.D. needs.

Phase II - Property that could not be economically developed at this time because of either poor soils conditions or delay in acquisition. It also includes a portion of the proposed land mass to be filled by use of dredge material.

Phase III - The remainder of the proposed master plan acreage which is all dredge-fill material.

The State Docks Department is actively pursuing this plan by purchasing land adjacent to Garrows Bend.

The South Alabama Regional Planning Commission, in accordance with Section 208 of Public Law 92-500, is currently responding to the need for a regional wastewater management plan for Mobile and Baldwin Counties. The critical water quality management needs of the region, identified and addressed in the 208 study, are listed below:

- The lower Mobile River segment with Chickasaw Creek and Three Mile Creek, because of point source discharges and the concentration of dischargers in this area.

- The upper part of Mobile Bay, because of the numerous semipublic and private discharges along the causeway and the eutrophication problem. This causeway also presents a prime area for resolution of an institutional problem. The permanent closure of the upper part of the bay to oyster harvesting and the dredging of the ship channel pose other problems to be addressed in the 208 study.

- The Theodore area, and specifically the point and nonpoint discharges from an industrially developing area.

- The nonpoint sources of discharge from urban industrial, commercial, residential, resort, agricultural, and silvaculture areas.

The Alabama Coastal Area Board will review alternative plans to determine consistency with their plan for environmental protection and economic benefits to the project area. In general, their plan encourages economic growth with no environmental loss.

MANAGEMENT MEASURES

Specific features to be considered in formulating any plan include not only navigation improvements but also the possibility of investigating measures other than identified navigation problems. These measures are outlined below.

• NAVIGATION MEASURES

Deepen and/or widen the main ship channel.
Widen and deepen the authorized Theodore Ship Channel.
Provide and maintain a barge marshaling area in Garrows Bend.
Provide an anchorage area near upper limits at Main Bay Channel.
Provide a turning basin below the Interstate 10 tunnels.
Reduce traffic delays with a passing lane.

• DREDGED MATERIAL DISPOSAL MEASURES

Construct islands or fill area adjacent to shore.
Open-water disposal in the bay and gulf
Upland disposal sites
Recycle material off existing disposal sites.
Abate shore erosion with dredged disposal material.

- **WATER QUALITY MEASURES**

Remove obstructions to improve water circulation.

Fill depressions in bay to improve water quality.

- **FISH AND WILDLIFE MEASURES**

Improve areas adjacent to causeway.

Establish additional oyster beds.

- **PORT DEVELOPMENT MEASURES**

Offshore terminals

Future expansion area

ANALYSIS OF PLANS CONSIDERED IN STAGE 1 AND 2 PLANNING

DESCRIPTION OF PRELIMINARY ALTERNATIVES

"No Action" Alternative. The "No Action" Alternative, as far as this study is concerned, is the development of the most probable future conditions that would exist if there were no Federal modification to the existing navigation project. There will be environmental, economic, and social effects associated with the "No Action" Alternative. These effects will be presented in the Stage 3 analysis of the detail plans. The Stage 1 presentation of the "No Action" Alternative is primarily concerned with the question of what happens to the existing and projected commodity movements and navigation traffic if no Federal action is undertaken to modify the Mobile Harbor, Alabama, project. Presented below are the possible scenarios:

- Light-loading of large vessels - The trend in vessel sizes in the world fleet is toward larger vessels. Many shipping companies which own larger ships use these larger vessels in harbors where the maximum loaded draft of the ship exceeds the channel dimensions of the harbor. In Mobile Harbor, this has become common practice for some bulk carriers. Ships with capacities up to 100,000 deadweight tons with potential loaded drafts considerably in excess of 40 feet presently call on Mobile Harbor. These vessels are light-loaded, thereby increasing the transportation costs to these shippers. This trend toward larger vessels and light-loading of these vessels would be expected to increase if no modifications were made to the existing navigation channels for Mobile Harbor.

- Movement of smaller vessels at less efficiency - If the channel depth remains at 40 feet for Mobile Harbor the channel will become more congested because most of the bulk commodity movements will be in greater numbers of smaller vessels. By maintaining transportation costs at higher levels, this congestion eliminates the possibility of economic advantage to the Mobile region in navigation transportation savings.

Environmental Quality Alternative. An inventory analysis was made to determine those environmental resources which should be preserved, enhanced, protected or approached with care. Of primary concern in the formulation of the EQ alternative was the management of Mobile Bay such that no degradation of the water quality or fish and wildlife resources would take place. The following paragraph contains measures that have potential environmental enhancement effects.

Existing maintenance of the entrance channel provides sand that can be utilized to restore the eroded beaches of Dauphin Island; the ridges along the upper bay ship channel can be removed and material placed such that it will abate shore erosion along the western shore of Mobile Bay; a portion of the material taken from the ridges can be placed such that it will fill depressions in Mobile Bay that cause stratification of water and lead to dissolved oxygen deficiencies; additional oyster beds can be established in areas found suitable for such; openings in the causeway can be created to improve the circulation in the bay area north of U.S. Highway 90; freshwater flow in Mobile Delta can be regulated to dilute the saline waters created by the existing ship channel; and an opening in the fill connecting McDuffie Island to the mainland can be removed to improve circulation in the Garrows Bend area.

Navigation Development Alternatives. Various alternative plans for improving navigation were formulated.

- Provide an enlarged channel to the Port of Mobile. This alternative would involve deepening and/or widening the Mobile Bar and Bay Ship Channel into the mouth of Mobile River. Because of the restrictions of the Bankhead and Interstate 10 Tunnels, deepening of Mobile River would not be considered north of the tunnels.

- Provide an enlarged channel into the Theodore Industrial Area. This would involve deepening and widening the planned Theodore Ship Channel from the authorized 40-foot-deep by 400-foot-wide Bay Channel and 40-foot-deep by 300-foot-wide land cut channel.

- Provide a turning basin opposite McDuffie Island.

- Provide an anchorage area just south of McDuffie and Little Sand Islands.

- Adoption of the Garrows Bend Channel and McDuffie Island barge marshaling area for maintenance.

- Provide a passing lane along the main Bay Ship Channel in the vicinity of the Theodore Channel in lieu of enlarging the entire bay channel to reduce traffic delays.

- Provide additional width at the upper end of the main ship channel to eliminate handling problems and safety hazards in the area.

Alternative Port Expansion Plans. The following options were evaluated:

- Offshore terminals for bulk commodities.

- Tracts presently owned by the Alabama State Docks Department or private interests.

- Land that can be purchased or created.

Dredged Material Disposal Alternatives. The following dredged material disposal alternatives were formulated:

- **Mobile Bay Island or Fill Alternatives.** The island and fill areas would be so designed to contain all new work and maintenance material for a 50-year period.

- **Open-Water Disposal.** Two open-water disposal concepts were considered. First was the removal of all new work and maintenance material to the Gulf of Mexico. Second was the disposal of all new work and dredged maintenance material along the channels in Mobile Bay in such disposal areas currently used.

- **Upland Disposal.** This alternative involves removal of all new work and dredged maintenance material for a period of 50 years to upland disposal sites.

COMPARATIVE ASSESSMENT AND EVALUATION OF PLANS

The development of intermediate alternatives focused on advancing more specific plans for Environmental Quality, the enlargement of the Mobile Ship Channel and the enlargment of the authorized Theodore Ship Channel. The barge marshaling area and its entrance channel were dropped from considered plans since they are considered local responsibilities set aside for a localized use of delivering coal to the McDuffie Terminal. The offshore facility concept was also dropped from further consideration due to the lack of effectiveness and efficiency. Alternatives for dredged material disposal evaluated at this stage of the planning process were arbitrarily related to a

50-foot deep-draft channel with commensurate widths, anchorage basins, turning areas and auxiliary barge and access channels. These efforts were oriented toward evaluating disposal plan effects on the bay's environment and the selection of the better plans to be applied with channel improvement alternatives.

Seven of the dredged material disposal plans formulated during preliminary studies were evaluated on a physical model of Mobile Bay located at the Waterways Experiment Station at Vicksburg, Mississippi. The primary environmental objective of the tests was to analyze the effect the larger channel and disposal alternative would have upon salinity values within Mobile Bay. Results of the model tests indicated that all plans caused similar salinity changes regardless of island placement. Generally, the changes under the low inflow conditions included an increase in salinity in the upper bay and a freshening of the lower bay areas.

The selection of plans for further consideration was based on the cost, environmental, and socioeconomic analyses performed, the input from the public at a meeting of the Mobile Harbor Advisory Committee on 5 August 1976, and a plan formulation public meeting held in Mobile, Alabama, on 22 November 1976. Inferior plans were eliminated and those which exhibited promise from cost, environmental, and socioeconomic standpoints were selected for further consideration. The rationale for these selections follows.

The Upland Disposal Plan was eliminated because of excessive costs and adverse socioeconomic and environmental effects. This plan was extremely expensive compared to the other alternatives. There were also severe socioeconomic and environmental effects associated with the large land areas required to store all of the dredged material over the life of the project.

A Theodore Rehandling Plan was investigated to determine if there would be savings by using the proposed Theodore disposal island as a place to store dredged material for drying and consolidation before transport to the Gulf of Mexico. In a detail investigation of this plan, the costs of double handling of the material made this plan more expensive than first indicated. Since this plan is very similar to the Mobile Bay Island or Fill and Gulf Disposal Plan with transport of the maintenance material to the Gulf of Mexico, yet more expensive than this plan, the Theodore Rehandling Plan was eliminated from further consideration.

The Mobile Bay Island and Fill Plans which consisted of five plans with disposal islands in upper and lower Mobile Bay had both advantages and disadvantages. The major drawback for these alternative plans is that they are extremely expensive. This is due in large part to the fact that a sheetpile or bulkheaded wall is considered necessary to retain the material in lower Mobile Bay, making the large disposal island in the lower bay extremely costly. This plan has advantages since all of the new work and maintenance material would be contained within diked or bulkheaded disposal areas. However, these plans, as a total concept, were eliminated from further consideration, mainly due to the excessive cost.

The Open-Water Disposal Plan, where all the new work and maintenance material from the channel enlargement would be deposited along the existing channels in Mobile Bay, is the least expensive of all plans. This Open-Water Disposal Plan would cause environmental problems due to the extremely large quantities of new work material deposited alongside the channel. These deposits of new work material alongside the channel would physically divide the bay, totally change its circulation patterns, and water quality could be severely degraded in large areas.

INTERMEDIATE ALTERNATIVES

Four remaining disposal plans, along with the Shoreline Disposal Option which could be implemented with any plan, were selected for further analysis in Stage 2 of the planning process. These alternative plans along with the "No Action" Plan and Environmental Quality Plan are all considered worthy of further study and are discussed in subsequent paragraphs.

"No Action" Plan. The "No Action" Plan would involve no changes in the authorized navigation improvements for Mobile Harbor. Under this plan current trends in economic development, environmental quality, and port development would continue. The forecasted pattern of port development and economic and environmental conditions are based on the following assumptions regarding future conditions of the Mobile Harbor project.

- The authorized 40- by 400-foot channel to the Theodore Industrial Complex will be constructed.

- The current practice of open-water disposal of dredged maintenance material in Mobile Bay will continue.

- There will be a continuing and pressing need for disposal areas for dredged maintenance material from Mobile River.

- Port development for Mobile Harbor will take place in the vicinity of existing port facilities, at McDuffie Island, and along the Theodore Ship Channel in the Theodore Industrial Area.

- The commodities projected for the year 2044 will probably continue to move through the port of Mobile, although at greater costs and even though considerable traffic delays will occur due to the greater number of vessels.

The "No Action" Plan provides an alternative course of action for the citizens of the Mobile region and will provide the base condition from which the costs, benefits, and socioeconomic and environmental effects of all other alternatives are measured. No costs or economic benefits are associated with the "No Action" Plan.

Environmental Quality (EQ) Plan. This plan was formulated to address the concerns of the pilots that handle the larger deep-draft vessels in the present restricted bay channel and also known environmental concerns and opportunities. The plan would widen the existing main bay channel up to the mouth of Mobile River. This would provide a safer channel and reduce the probability of accidents.

The existing maintenance methods of Mobile Harbor would be modified as follows:

- Maintenance of the entrance channel provides sand that can be utilized to restore the eroded beaches of Dauphin Island.

- The existing ridges in the upper bay created by natural sedimentation and dredged material that was disposed of alongside the main bay channel can be removed and the material placed such that it will fill depressions in Mobile Bay that cause stratification of water. Existing and future maintenance in the upper and lower bay channel will be carried to the Gulf of Mexico for disposal.

All new work dredged material will be transported by dump scows to a gulf disposal site or utilized to abate shoreline erosion along the western shore of Mobile Bay. The circulation in the bay can be further enhanced by providing additional openings in the U.S. Highway 90 causeway and by providing an opening in the fill connecting McDuffie Island to the mainland. Also, freshwater circulation in Mobile Delta can be modified to offset the effects of the existing saltwater wedge in the ship channel. These circulation alterations along with the idea of establishing additional oyster beds can be implemented with any structural plan; however, this will require detailed studies prior to their recommendation.

Brookley Expansion Area and Gulf Disposal Plan No. 1. This plan involves the construction of an expansion area in Mobile Bay, just south of McDuffie Island, adjacent to the Brookley Industrial Complex. An island would also be constructed on the east side of the ship channel extending southward from Little Sand Island. The expansion area adjacent to the Brookley Complex will contain the new work material from the enlarged channel in upper Mobile Bay and will also have space reserved for maintenance material from the upper bay. The island on the east side of the channel would be constructed with a ring dike of new work material from the enlarged Mobile Ship Channel and would be sized to contain 50 years of dredged maintenance material from Mobile River. New work material from the enlarged Theodore Channel and lower bay and bar channels would be transported to the Gulf of Mexico for disposal. The maintenance material from these same areas would also be transported to the Gulf of Mexico for disposal. This plan was formulated to minimize open-water disposal in the bay of new work dredged material and eliminate all open-water disposal of dredged maintenance material in the bay.

Brookley Expansion Area and Gulf Disposal Plan No. 2. This plan involves all the same elements as the Brookley Expansion Area and Gulf Disposal Plan No. 1 except that maintenance material from the lower bay channel and Theodore Channel will be disposed of in Mobile Bay instead of the Gulf of Mexico. Disposal of maintenance material from the lower bay channel will be in the currently approved maintenance areas on either side of the channel. After capacity of the Theodore disposal island is reached, the maintenance material from the Theodore Channel will be disposed of south of the Theodore Channel and west of the lower bay disposal. Placing maintenance material in open water in the lower bay is not as environmentally acceptable as utilizing the gulf for disposal; however, the plan represents a realistic tradeoff due to the cost of transporting the material to the gulf. This plan in lieu of the unacceptable open-water disposal plan most closely meets the NED objectives.

Gulf Disposal Plan No. 1. This plan calls for the removal of all new work and dredged maintenance material from the enlarged Mobile Ship Channel and Theodore Ship Channel to the Gulf of Mexico. The maintenance material from the authorized 40- by 400-foot Theodore Industrial Channel would be placed in the Theodore disposal island being constructed in conjuction with the Theodore Ship Channel until its capacity would be reached. At such time that material would also be conveyed to the gulf for disposal. This plan makes no provision for storage of future maintenance material from the Mobile River channel, however, it is oriented toward the EQ objectives in that it eliminates all open-water disposal of dredged material in Mobile Bay. The tradeoffs of this plan are primarily the economic costs of transporting the dredged material to the gulf and the land enhancement benefits foregone.

Gulf Disposal Plan No. 2. This plan embraces all of the features of Gulf Disposal Plan No. 1 with the exception that maintenance material from the enlarged Mobile Ship Channel will all be discharged into Mobile Bay in accordance with current practice. Maintenance material from the Theodore Ship Channel will be disposed of in the disposal island and also into open water south of the Theodore Ship Channel and west of the Mobile Ship Channel.

CONCLUSIONS (SCREENING)

Implementation of any of the four channel deepening alternatives would cause about the same socioeconomic effects. Construction of Brookley Expansion Area Plans No. 1 and No. 2 would induce more industrial development and port expansion in this area than would occur with the EQ or Gulf Disposal Plans. The four channel deepening plans would create an economic advantage for the Port of Mobile in comparison to other ports. The economic advantages would result in an increase in original economic and industrial development and would result in increased employment and demographic growth. Economic growth and port expansion would occur at a slower rate in the absence of deeper ship channels to Mobile and Theodore. Either plan as compared with "No Action" has significant national and international effects in terms of world resource distributions and import-export balances. The preliminary environmental effects assessment of the channel deepening plans as compared to the "No Action" (no development) Plan are presented in Table 3. The cost analysis performed at this stage of the planning process was to the detail required to compare alternative plans fairly. The Stage 2 plans were not designed in detail but continued to be somewhat conceptual in nature. For this reason, the cost and benefit estimates for Stage 2 plans were not detailed in scope and serve only for relative comparison. These benefits and cost indicators are also given in Table 3. Further studies are required at this time to assess the costs and benefits of the Channel Widening (EQ) Plan.

TABLE 3

PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOBILE HARBOR NAVIGATIONAL IMPROVEMENTS

	CHANNEL MODIFICATIONS			
Environmental Effects	Mobile and Theodore Channels	Mobile Channel Only	Theodore & Lower Bay Channels Only	No Development
Hydrological	Significant changes in salinity gradients (see Disposal Alternatives salinity gradients). No other significant effects.	Significant changes in salinity gradients.1/ No other significant effects.	Less changes in salinity gradients than with all main channels modified.1/ No other significant effects.	No effects.
Archeological	No significant sites affected by Theodore Channel. Archeological survey may be required for widening Mobile Ship Channel; no known sites affected.	Archeological survey may be required for widening Mobile Ship Channel; no known sites.	No significant sites affected by Theodore Channel. Archeological survey may be required for lower bay channel; no known sites affected.	No effects.
Natural Resources	Additional wetlands committed to Theodore Channel. Loss of bay bottom with wider Mobile Channel and Theodore Channel.	Loss of bay bottom with wider Mobile Channel.	Additional wetland and bay bottom committed to Theodore Channel. Also, loss of bay bottom if lower bay channel widened.	No effects.
Ground Water	Deepening the Theodore Channel could affect shallow freshwater aquifers.2/	No significant effects.	Deepening the Theodore Channel could affect shallow freshwater aquifers.2/	No effects with Mobile Bay Channel.2/

TABLE 3 (cont'd)

PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOBILE HARBOR NAVIGATIONAL IMPROVEMENTS

	GENERAL DISPOSAL ALTERNATIVES				
Section 404 Considerations3/	Brookley Expansion Area & Gulf Disposal Plan No. 1	Brookley Expansion Area & Gulf Disposal Plan No. 2	Gulf Disposal Plan No. 1	Gulf Disposal Plan No. 2	No Development
Physical Effects					
Wetlands	Destruction of at least 70 acres of saltwater marsh during construction of upper bay fill areas.	Destruction of at least 70 acres of saltwater marsh during construction of upper bay fill areas.	No effects.	No effects.	Continued destruction of saltwater marsh areas in upper bay with the disposal of maintenance material from the river.
Water Column	Minor turbidity during construction of island and fill areas; disposal of new work material in Gulf and periodic disposal of maintenance material from lower bay at Gulf disposal site.	Minor turbidity during construction of island and fill areas in upper bay; disposal of new work material in Gulf and periodic disposal of maintenance material in lower bay.	Minor turbidity during disposal of new work material and periodic disposal of maintenance material at Gulf disposal site from bay channels.	Minor turbidity during disposal of new work material at Gulf disposal site, and periodic disposal of maintenance material at Gulf disposal site from bay channels.	Minor turbidity during periodic disposal of maintenance material adjacent to the channel in the upper and lower bay.
Benthos	Destruction of benthic communities at island and fill areas and Gulf disposal site. Additional smothering due to mud flows. The communities could reestablish at the Gulf disposal site between maintenance dredging of the lower bay and at the areas subjected to mud flows.	Destruction of benthic communities at island and fill areas, Gulf disposal site, and lower bay disposal areas. Additional smothering due to mud flows. The communities could reestablish at the Gulf disposal site, areas subjected to mud flows, and at the lower bay disposal areas between maintenance dredgings.	Destruction of benthic communities at Gulf disposal site. Additional smothering due to mud flows. The communities could reestablish between maintenance dredgings of the bay channels.	Destruction of benthic communities at Gulf disposal site and bay disposal areas. Additional smothering due to mud flows. The communities could reestablish at the Gulf disposal site, and at the bay sites between maintenance dredgings.	Destruction of benthic communities during disposal of maintenance material in bay; however, reestablishment is fairly complete between dredgings.

TABLE 3 (cont'd)

PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOBILE HARBOR NAVIGATIONAL IMPROVEMENTS

GENERAL DISPOSAL ALTERNATIVES (cont'd)

Section 404 Considerations3/	Brookley Expansion Area & Gulf Disposal Plan No. 1	Brookley Expansion Area & Gulf Disposal Plan No. 2	Gulf Disposal Plan No. 1	Gulf Disposal Plan No. 2	No Development
Physical Effects (cont'd)					
Water Circulation	Minor alteration of surface current patterns in the upper bay. No significant effects at Gulf disposal site if the material is distributed over a broad area.	Minor alteration of surface current patterns in the upper bay. Possible continued alteration of circulation in lower bay due to disposal maintenance material adjacent to the channel.4/ No significant effects at the Gulf disposal site if the material is distributed over a broad area.	No significant effects if the material is distributed over a broad area.	Possible continued alteration of circulation in upper and lower bay due to disposal of maintenance material adjacent to the channel.4/ No significant effects at Gulf disposal site if the material is distributed over a broad area.	Possible continued alteration of circulation in the upper and lower bay due to disposal of maintenance material adjacent to the channel.4/
Salin. Gradients	Salinity increases in upper bay and freshening of lower bay.5/ Considering existing salinity gradients, no major adverse effects are expected at the four critical areas of the bay (see Figure 1). Cedar Point area and Klondike area approaching threshold of impact (Cedar Point +0.8 o/oo; Klondike -1.6 o/oo).	Same as Brookley Expansion Plan No. 1.	Similar to Brookley Expansion Plan No. 1 except less adverse changes in salinities at Cedar Point oyster reef (-0.5 o/oo). More adverse effect at South of Channel area (-1.3 o/oo) and White House (-0.7 o/oo).	Similar to Brookley Expansion Plan No. 1 except less adverse changes in salinities at Cedar Point oyster reef (-0.5 o/oo); more adverse change at South of Channel area (-1.3 o/oo) and White House (-0.7 o/oo).	No change in salinity gradients.

TABLE 3 (cont'd)

PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOBILE HARBOR NAVIGATIONAL IMPROVEMENTS

Section 404 Considerations3/	GENERAL DISPOSAL ALTERNATIVES (cont'd)				
	Brookley Expansion Area & Gulf Disposal Plan No. 1	Brookley Expansion Area & Gulf Disposal Plan No. 2	Gulf Disposal Plan No. 1	Gulf Disposal Plan No. 2	No Development
Chemical-Biological Interactive Effects					
Water Column	Minor release of heavy metals or other pollutants at island and fill areas during construction, and at Gulf disposal site during disposal of new work material and periodic disposal of maintenance material from the lower bay.	Minor release of heavy metals or other pollutants at island and fill areas during construction, at Gulf disposal site during disposal of new work material, and at disposal areas adjacent to the channel in the lower bay during disposal of maintenance material.	Minor release of heavy metals or other pollutants at Gulf disposal site during disposal of new work material and periodic disposal of maintenance dredged material from bay channels.	Minor release of heavy metals or other pollutants at Gulf disposal site during disposal of new work material, and at disposal areas adjacent to the channel in the upper and lower bay during periodic disposal of maintenance material.	Minor release of heavy metals or other pollutants at disposal areas adjacent to the channel in the upper and lower bay during periodic disposal of maintenance material.
Comparison of Sites					
Shellfish	Occasional commercial shrimping at Gulf disposal site. Nursery grounds for shrimp and crabs at upper bay fill areas. Significant sport shrimping at upper bay disposal area.	Occasional commercial shrimping at Gulf disposal site. Nursery grounds for shrimp and crabs at upper bay fill area. Significant crabbing area and major oyster reefs in vicinity of lower bay disposal areas. Significant shrimping at bay disposal areas.	Occasional commercial shrimping at Gulf disposal site.	Occasional commercial shrimping area at Gulf disposal site. Nursery grounds for shrimp and crabs in vicinity of upper bay disposal areas. Significant crabbing and shrimping areas and major oyster reefs in vicinity of bay disposal areas.	Significant shrimping near bay disposal areas. Nursery grounds for shrimp and crabs in vicinity of upper bay disposal areas. Significant crabbing areas and major oyster reefs in vicinity of bay disposal areas.

TABLE 3 (cont'd)

PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOBILE HARBOR NAVIGATIONAL IMPROVEMENTS

GENERAL DISPOSAL ALTERNATIVES (cont'd)

Section 404 Considerations3/	Brookley Expansion Area & Gulf Disposal Plan No. 1	Brookley Expansion Area & Gulf Disposal Plan No. 2	Gulf Disposal Plan No. 1	Gulf Disposal Plan No. 2	No Development
Comparison of Sites (cont'd)					
Fisheries	Commercial and sport fishing grounds at Gulf and bay disposal sites. Nursery, spawning grounds, and feeding site at upper bay disposal areas.	Commercial and sport fishing grounds at Gulf and bay disposal sites. Nursery, spawning grounds, and feeding site at upper bay disposal areas.	Commercial and sport fishing grounds at Gulf disposal site.	Commercial and sport fishing grounds at Gulf and bay disposal areas. Nursery, spawning grounds and feeding sites in vicinity of upper bay disposal areas.	Commercial and sport fishing grounds at bay disposal areas. Nursery, spawning grounds and feeding sites in vicinity of upper bay disposal area.
Wildlife	Waterfowl habitat at island and fill disposal areas.	Waterfowl habitat at island and fill disposal areas.	None.	Waterfowl habitat in vicinity of upper bay disposal areas.	Waterfowl habitat in vicinity of upper bay disposal areas.
Recreation	Boating, fishing and swimming in bay and Gulf.	Boating, fishing and swimming in bay and Gulf.	Boating, fishing and swimming in Gulf.	Boating, fishing and swimming in bay and Gulf.	Boating, fishing and swimming in bay.
Threatened & Endangered	None endemic to vicinity of disposal areas.	None endemic to vicinity of disposal areas.	None endemic to vicinity of disposal areas.	None endemic to vicinity of disposal areas.	None endemic to vicinity of disposal areas.

TABLE 3 (cont'd)

PRELIMINARY ENVIRONMENTAL ASSESSMENT - MOBILE HARBOR NAVIGATIONAL IMPROVEMENTS

	GENERAL DISPOSAL ALTERNATIVES (cont'd)				
Section 404 Considerations3/	Brookley Expansion Area & Gulf Disposal Plan No. 1	Brookley Expansion Area & Gulf Disposal Plan No. 2	Gulf Disposal Plan No. 1	Gulf Disposal Plan No. 2	No Development
Comparison of Sites (cont'd)					
Wetlands	Approximately 70 acres of saltwater marsh in upper bay at proposed fill area. Other saltwater marsh areas also in the vicinity of the fill area.	Approximately 70 acres of saltwater marsh in upper bay at proposed fill area. Other saltwater marsh areas also in the vicinity of the fill area.	None.	Saltwater marsh areas in vicinity of upper bay disposal.	Saltwater marsh area in the vicinity of upper bay disposal area and used for disposal of maintenance material from the river.

1/ Conclusions based on interpretation of results of model studies with all channels modified (also see Disposal Alternatives, Salinity Gradients).

2/ Studies are currently being conducted to determine the effects on ground water of construction of the Theodore Channel.

3/ Due to the changing state of guidelines and regulations, further studies may be warranted in the future.

4/ A study is currently being conducted to analyze the buildup of dredged material placed adjacent to the channel and its effect on water circulation.

5/ Results based on model studies with the depth and width of the main channel through Mobile Bay and the Theodore Channel being 50 feet x 500 feet.

TABLE 3 (cont'd)
Preliminary Environmental Assessment -
Mobile Harbor Navigation Improvements
(Economic Considerations)

General Disposal Alternatives	Preliminary Annual Benefits ($1,000,000)	Preliminary Annual Costs ($1,000,000)
Brookley Expansion Area & Gulf Disposal Plan No. 1	54	34
Brookley Expansion Area & Gulf Disposal Plan No. 2	54	24
Gulf Disposal Plan No. 1	54	46
Gulf Disposal Plan No. 2	54	31

ALTERNATIVES ELIMINATED

Certain alternative plans and measures of improvement to Mobile Harbor have been excluded from consideration because of inefficiency or their failure to meet the indicated needs in the study area. These alternatives are discussed in the following paragraphs.

Gulf Disposal Plan No. 2. This plan provides for placing maintenance material from the enlarged Mobile Ship Channel and Theodore Ship Channel in Mobile Bay. This plan neither yields the maximum net benefits, provides storage for maintenance from Mobile River, or meets the planning objective of improving water circulation in the bay.

Shoreline Disposal Option. A survey of property owners along the western shore of Mobile Bay was made to determine the interest in placing dredged material along the shoreline to abate the existing erosion problem. Various objections expressed included environmental damage, aesthetic degradation, and restriction of riparian rights. A tabulation of these comments clearly indicated that such a solution was not desired or acceptable by the majority of shoreline property owners.

A detailed cost estimate and benefit analysis was made to compare the level of development for each alternative selected for further study. At this stage of the study it became apparent that multiple use of a deeper channel into the Theodore Industrial Park and commodity movements to incrementally justify the enlargement could not be assured; therefore, no further consideration of this channel segment was made. Also, the cost estimates show it is not cost effective to construct an island on the east side of the upper bay channel below Little Sand Island to contain annual dredged disposal material. Transporting the maintenance material to the gulf is a more feasible alternative to the cost of constructing and protecting disposal island dikes. Costs developed for the detailed plans are based on the gulf dredged material disposal site being located within a 16-mile radius of the mouth of Mobile Bay.

ASSESSMENT AND EVALUATION OF DETAILED PLANS

The plans retained for further analysis are all considered implementable. They were evaluated in terms of acceptability, completeness, effectiveness, efficiency, and optimization. The plans were also evaluated with respect to meeting specific study area needs as well as the national planning objectives, accounts and constraints. Pertinent data and necessary analysis to establish optimum development levels are presented in Appendix 5, Section D. Descriptions and evaluations of the alternatives are presented in the following paragraphs.

"NO ACTION" PLAN

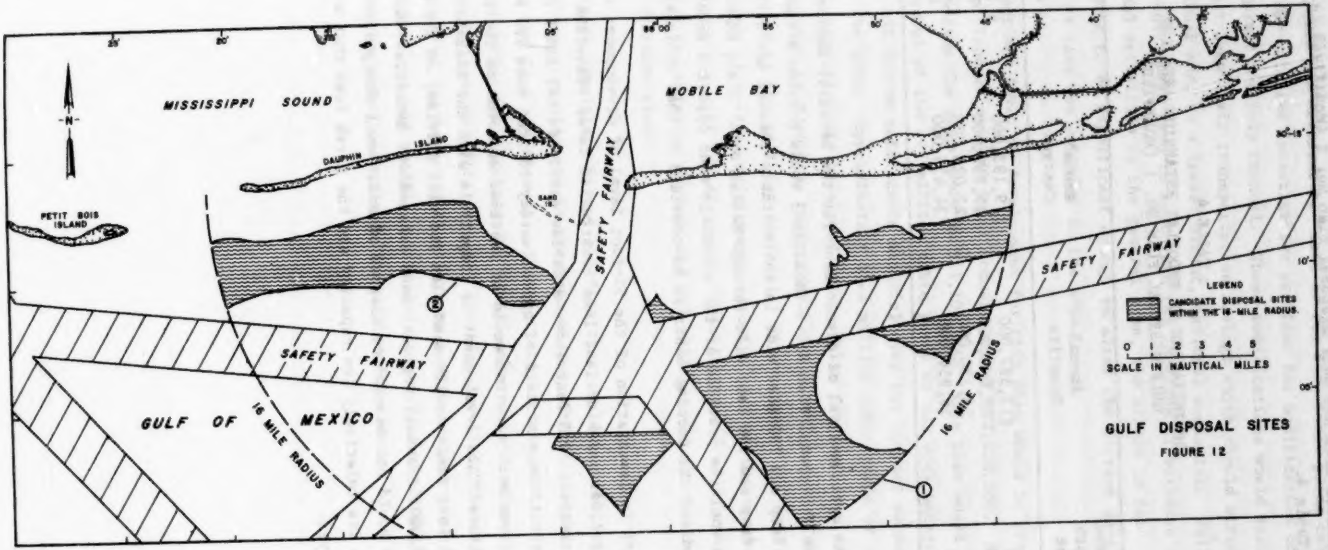
Plan Description. The "No Action" Plan would involve no changes in the authorized navigation improvements for Mobile Harbor. Under this plan, current trends in economic development, environmental quality, and port development would continue.

Evaluation and Assessment. The "No Action" Plan provides an alternative course of action for the citizens of the Mobile region and will provide the base condition from which the costs, benefits, and socioeconomic and environmental effects of all other alternatives are measured. No additional costs or incremental positive economic benefits are associated with the "No Action" Plan. An analysis of this alternative shows that more than 17 million dollars a year as an average will be lost from traffic delays. Since the present trends in deep-draft shipping are toward use of larger vessels, the existing and projected problems could be expected to become more acute.

BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (Modified)

Plan Description. This plan provides for deepening and widening the entrance channel and the main bay channel, providing an anchorage area near the upper limits of the main bay channel, and providing a turning basin opposite McDuffie Island. This plan involves the construction of a fast land expansion area in Mobile Bay, just south of McDuffie Island, adjacent to the Brookley Industrial Complex. New work material dredged from the upper 7.4 miles of bay channel, the anchorage area and turning basin would be utilized to construct dikes along the perimeter of the Brookley disposal area and to construct fast land. The remainder of the new work material from the upper bay reach above Theodore Channel intersection would be transported by hydraulic pipeline dredge to fill the southern portion of the Brookley disposal area. New work material from the lower bay and entrance channels would be transported with dump scows to the Gulf of Mexico for disposal (see area 1, Figure 12). The existing and future maintenance dredged material from the main bay channel would also be transported to the Gulf of Mexico for disposal (see area 2, Figure 12). This plan was formulated to provide additional fast land for harbor development, minimize open-water disposal of new work dredged material in the bay, and eliminate all existing and future open-water disposal of dredged maintenance material in the bay.

Derivation of the optimum level of channel development required a detailed analysis of shipping needs, commodity movements and projections, and an economic analysis of vessel fleets that would operate with various channel widths and depths. These studies indicate that maximum net benefits could be achieved from a channel with dimensions commensurate with a 55-foot depth main channel through Mobile Bay. A comparison of annual benefits, annual costs and net benefits for the 45-, 50-, 55- and 60-foot levels of development for the Brookley



MISSISSIPPI SOUND
MOBILE BAY
GULF OF MEXICO
DAUPHIN ISLAND
PETIT BOIS ISLAND
SAND IS.
-N-
SAFETY FAIRWAY
SAFETY FAIRWAY
SAFETY FAIRWAY
16 MILE RADIUS
16 MILE RADIUS
①
②
LEGEND
▨ CANDIDATE DISPOSAL SITES WITHIN THE 16-MILE RADIUS.
0 1 2 3 4 5
SCALE IN NAUTICAL MILES
25'
20'
15'
05'
88°00'
55'
50'
45'
40'
30°15'
10'
05'

GULF DISPOSAL SITES

FIGURE 12

Expansion Area and Gulf Disposal Plan No. 1 (Modified) is displayed in Table 4.

TABLE 4

OPTIMIZATION OF BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (MODIFIED)

Channel Depth Feet	Annual Benefits	Annual Charges	Net Benefits
45	$12,597,000	$ 9,195,000	$ 3,402,000
50	22,646,000	15,252,000	7,394,000
55	33,130,000	22,028,000	11,102,000
60	38,956,000	34,435,000	4,521,000

The optimum level of development for the Brookley Expansion Area and Gulf Disposal Plan No. 1 (Modified) would provide a channel 57 feet deep and 700 feet wide in the entrance channel and a channel 55 feet deep and 550 feet wide through Mobile Bay. Also, commensurate depth would be provided at the anchorage area opposite McDuffie Island and the turning basin to be provided in that vicinity.

With implementation of the 55-foot level of development approximately 1,047 acres of fast land constructed to an elevation of approximately 17.5 feet above mean low water and 663 acres constructed to an elevation of approximately 15 feet mean low water of softer new work material would be provided adjacent to the Brookley shoreline. This development is compatible with the Alabama State Docks' long-range development plan and will provide, on the average, $2,697,000 in annual regional land enhancement benefits. McDuffie Island would not be used to dispose of additional dredged material due to its relatively low capacity and the marsh land that would be destroyed.

Evaluation and Assessment. Each of the structural plans carried forward for detailed investigation provides for modification of the Mobile Harbor and Ship Channel. These modifications would result in additional deep-draft transportation savings which should strengthen the regional and, to a lesser extent, national economies. While the improvements would tend to encourage the location of business and industrial activities in the general area, the effect is not anticipated to be significant enough to alter the current development trends and land use patterns in the area.

The optimum level of development for this plan would be provided and maintained at an additional annual cost of $22,028,000. Net benefits from the plan would be $11,102,000. This plan would provide for disposal of the 143 million cubic yards of new work material as well as all future maintenance material over the 50-year economic life of the plan. Approximately 65.3 million cubic yards of new work dredged material would be placed in the diked disposal area in the upper bay and 77.8 million cubic yards of new work material will be transported to the gulf for disposal. An average of 4.7 million cubic yards of dredged maintenance material will be transported annually to the gulf for disposal. This includes 4 million cubic yards for the existing project and 0.7 million cubic yards induced by the alternative plan.

- **Direct Benefits.** Direct benefits that would be realized under this alternative plan are in the form of deep-draft transportation savings and land enhancement. Transportation savings will be realized during the construction period; however, for the purpose of this study these benefits were not considered. Also, the improved efficiency of the harbor will eliminate traffic delays due to constrained one-way traffic in the main channel, lack of anchorage areas in the upper harbor and limited turning areas.

• **Socioeconomic Impacts of the Considered Plan.** As discussed in Appendix 5, Section D, certain socioeconomic trends expected to occur in the area under the "No Action" Plan would be induced with construction of this alternative plan. There would be an increase in population, employment, housing, industrial and commercial development, water-borne commerce, and port expansion. As the population in the study area continues to grow more land now used for other purposes will be converted to urban and built-up uses. This is particularly true for the heavy growth areas west of Mobile and south of Theodore. Baldwin County is also becoming more attractive to residential growth. Concomitant commercial development is expected to occur in the areas of residential development. The location of the industrial spine in Mobile is not expected to change significantly, although the demand for industrial land will increase. Industrial growth is projected to expand primarily along upper Mobile Bay, north along the Mobile River, and south in the Theodore Industrial Park. Expansion of port terminal and handling facilities is also expected to occur with the proposed upper bay disposal site being a primary area of expansion.

• **Demographic Aspects.** Any population increase as a result of deepening the main ship channel would be insignificant to the BEA region or the Mobile SMSA. Any increase that might result from the implementation of the Brookley fill area would occur in the SMSA.

• **Population Density.** No measurable impact.

• **Population Mobility.** The increased level of industrial and commercial activity in the project area is expected to be accompanied with an immigration of population to the SMSA. An out-migration could occur in the immediate project area, however, if adverse environmental effects were to result from implementation of the project or residential properties were purchased for industrial or commercial use.

- **National Economic Development.** Implementation of a channel deepening plan would enhance national economy by improving transportation and handling facilities for ores and coal, among other items. The plan should also improve U.S. competition in foreign trade in these items. Transportation savings for imported materials would enhance the manufacturing competitiveness of the products proposed with the above bulk and other items.

- **Noise.** Noise from highway traffic and industrial activities is not significantly high at present, but the level of noise from these sources is expected to increase in the project area as a result of project implementation. Noise from other sources is either negligible or of short duration. Construction noise, for example, may be intense, but is of only a temporary nature.

- **Aesthetics.** Aesthetic effects which can be attributed to the Brookley expansion plans generally fall into three categories: visual effects, odor and noise. Because of the disposal of dredged material adjacent to the Brookley shoreline human activities associated with terrestrial aesthetic pursuits would be affected. Conversion of land use would be rendered less desirable for residential and recreational use from the standpoint of aesthetic amenities.

- **Housing.** Adequate land is available in the surrounding areas for residential developments associated with any population increase.

- **Displacement of People.** Student housing units are located on State property adjacent to the proposed Brookley fill area. The State is aware that such developments in their immediate vicinity would not take place for a number of years and therefore the residents can be relocated without any significant social impact.

- **Health.** The location of additional port facilities and increases in the number of workers in the area will increase the chances of industrial accidents. There is no apparent shortage of health facilities in this area.

- **Community Cohesion.** Since the implementation of the Brookley fill area implies the displacement of some people, community cohesion as it now exists in the immediate project area would be disrupted to a certain degree. The quality of life, life styles, and the relationships between persons in the community at large are not likely to change.

Selection of this plan would not be expected to significantly affect community cohesion in the Mobile SMSA. Certain groups within the region would regard the harbor improvements as a major boost to the economic well-being of the study area while others would be skeptical of alterations to the bay.

Anticipated growth will create conflicting demands for the study areas' freshwater resources. Much new industry is locating in the region to take advantage of the resource. Continued population growth will also require large amounts of fresh water.

- **Water Quality.** Control of water pollution associated with the increased development of the area will be a major concern. As indicated in Appendix 5, Section B, a water quality management plan for Mobile and Baldwin Counties has been developed by the South Alabama Regional Planning Commission in compliance with Section 208 of PL 92-500. In order to effectively improve water quality and assure attainment of water quality goals, the 208 study indicated that a regional structure is needed to coordinate the various city and agency water quality plans and standards. Such a structure would also facilitate the study of point and nonpoint sources of pollution and other water quality problems from a basin-wide perspective on a continuing basis. If the recommendations of the 208 study are adopted locally, certified by the Governor and approved by the Environmental Protection Agency, then the South Alabama Regional

Planning Commission, in conjunction with the Alabama Water Improvement Commission, will be assigned the responsibility to carry out the area-wide management program.

- **Air Pollution.** Since the study area is predicted to experience a continued growth level, the Division of Air Pollution Control, Bureau of Environmental Health, which monitors Mobile County's air quality, is presently developing an Air Quality Maintenance Plan for the county. The plan, which is mainly concerned with particulates, will cover the twenty-year period from 1975 through 1995, and will indicate the ambient air levels resulting from increased growth. It will then determine what, if any, additional regulatory measures will be necessary. New industrial development in the county will be subject to stringent regulations and extensive studies will be required to insure that the standards will not be violated as a result of the new development. Since most of the study area's industrial growth is expected to occur in Mobile County, Baldwin County is not projected to experience serious degradation to its air quality. It is also expected that when final compliance with Federal automobile emission standards is achieved, there will be a substantial reduction in the photochemical oxidant level. Stringent controls of new industrial development will also be necessary to assure this.

- **Environmental Effects.** Primary environmental impacts of this plan would be associated with: (1) channel construction and subsequent maintenance dredging operations, (2) construction and stabilization of the expansion area in the upper bay, and (3) offshore disposal of dredged material. A discussion of these impacts is contained in Appendix 5, Section D.

Potential Mitigation Measures. During the public meetings and work level conferences held during Stage I and II planning for this project, several measures were suggested by environmental agencies and groups which could be utilized to mitigate environmental damages resulting from any plan to deepen the Mobile Ship Channel. These measures include:

- Establish oyster beds in Bon Secour Bay.

- Improve water circulation in Mobile Bay by creating openings in ridges paralleling the main ship channel from Dog River to Mobile River.

- Restore tidal action in Chacaloochee Bay and Polecat Bay.

- Fill depressions which exist in Mobile Bay.

- Establish a recycle plan to remove material from existing Blakely and Pinto Island disposal areas.

- Replace wetlands destroyed.

- Provide better circulation behind McDuffie Island.

Since this plan would remove a significant quantity of shallow water bottom from production, this has been considered an important aspect for mitigation. Chacaloochee Bay was effectively removed from interaction with Mobile Bay by construction of the Mobile Delta Causeway. Tidal exchange is restricted to four 10-foot by 5-foot culverts passing under the highway. In order to provide full tidal flushing, almost the entire causeway across its mouth would require bridging. This is not considered feasible and may not be desirable for environmental reasons since the bay presently is heavily used by both sport fishermen and duck hunters. However, provisions for a partial restoration of tidal exchange would retard the rate of filling of the bay, provide a degree of control of undesirable aquatic plants, Eurasian milfoil along the northern boundary of the causeway, and restore much of the nursery value of the lower bay.

This measure could be implemented without additional model studies if the differing goals of the freshwater sportsman and the estuarine advocate could be resolved.

The establishment of oyster beds in Bon Secour Bay is not considered to be a desirable mitigation measure at this time, since the Bon Secour Bay has a historical record of very poor spatfall. Thus, it is doubtful that any reefs established would be self-maintaining. However, the circulation changes which would be induced by channel enlargement could greatly enhance this potential. Additional study is required.

Efforts to alter existing circulation patterns by opening channels in the upper bay or by filling the depression on the eastern side of the ship channel are viewed with reservation. Such actions have the potential of changing the long-term water quality of the bay in a positive manner. However, on the other hand, a certain amount of oxygen depletion is required if "jubilees" (fish move out of the water up on the shore) on the eastern shore are to continue. If the impact on larval forms is considered, "jubilees" may not be a bonanza as is commonly thought. Further investigation is required prior to implementation.

Approximately 70 acres of wetlands would be destroyed by constructing the Brookley fill. This loss will be mitigated by creating wetlands adjacent to the proposed fill.

The fill placed between McDuffie Island and the mainland will be opened to provide circulation behind McDuffie Island that has been partially blocked by the proposed Brookley fill area.

Implementation Responsibilities. Responsibility or development of this plan is divided between Federal and non-Federal interests in accordance with established policy and guidelines. The Federal

Government may construct or improve channels and harbors to meet the requirements of shipping, while non-Federal interests are responsible for terminal facilities, berthing areas, certain other components, and specified items of local cooperation.

The United States would design and prepare detailed plans, dredge the improved gulf and bay channels and turning and anchorage basins, and maintain the improvements to project dimensions, after Congressional authorization and funding.

Local interests would provide all lands, easements and rights-of-way; all relocations and alterations of utilities; all retaining works and stabilization measures required for disposal of dredged material; and depths in all berthing areas commensurate with those provided in related project areas.

Total average annual benefits for the 55-foot plan are evaluated at $33,130,000 including $30,433,000 navigation benefits and $2,697,000 land enhancement benefits. Land enhancement benefits are considered local and the cost allocated to land enhancement is a local responsibility. The benefits are summarized and allocated in Table 5.

The first cost of general navigation facilities for the 55-foot channel plan considered herein, excluding navigation aids, would be borne jointly by the United States and local interests. The apportionment is based on the ratios of "general" to "local benefits." According to the ratio of general to local benefits derived heretofore, 91.9 percent of the first cost of general navigation facilities would be borne by the Corps of Engineers and 8.1 percent by local interests.

TABLE 5

ALLOCATION OF BENEFITS
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (MODIFIED)

	Average Annual Value		
Type of Benefit	Total	General	Local
Navigation	$30,433,000	$30,433,000	-
Land Enhancement	2,697,000	-	$2,697,000
TOTAL	$33,130,000	$30,433,000	$2,697,000
Percent	100	91.9	8.1

The President, in his June 1978 water policy message to Congress, proposed several changes in cost-sharing for water resources projects to allow states to participate more actively in project implementation decisions. These changes include a cash contribution from benefiting states of 5 percent of first costs of construction assigned to nonvendible project purposes.

Application of this policy to this Mobile Harbor plan requires a contribution from the State of Alabama of an estimated $14,201,000 in cash (5 percent of $284,014,000 total estimated project first costs assigned to nonvendible project purposes, based on October 1978 price levels). Other items of local cooperation would not be affected by this additional requirement.

Estimated first costs, shown in Table 6, are based upon October 1978 dollar values. This table includes advance engineering and design costs, and the contributions required by local interests.

The presently estimated additional Federal annual maintenance is $1,424,000 which includes annual costs to the U.S. Coast Guard of $4,000 for maintenance of navigation aids. The estimated non-Federal average annual maintenance is $304,000.

BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 2, MODIFIED (NED)

Plan Description. This plan was retained as that plan which maximizes NED efficiency. The plan provides for deepening and widening the entrance channel and the main bay channel, and provides a turning basin opposite McDuffie Island. The gulf entrance channel would be constructed by hydraulic hopper dredge and the material placed in the gulf disposal site. New work material dredged from the

TABLE 6

ESTIMATE OF FIRST COST
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (MODIFIED)
OCTOBER 1978 PRICE LEVEL

FEDERAL FIRST COST	
Dredging	
Upper Bay Reach (above Theodore) **63,400,000 cu. yds. @ $1.04/cu. yd.**	**$ 65,936,000**
Lower Bay Reach **58,654,000 cu. yds. @ $1.28/cu. yd.**	**75,077,000**
Entrance Channel **19,019,000 cu. yds. @ $1.75/cu. yd.**	**33,283,000**
Mooring Dolphins (16 @ $54,142 ea.)	**866,000**
SUBTOTAL	**$175,162,000**
Contingencies @ 20%	**35,032,000**
Engineering & Design @ 3%	**6,306,000**
Supervision & Administration @ 3%	**6,495,000**
Interest during Construction (7 yrs. @ 6-7/8%)	**53,658,000**
SUBTOTAL	**$276,653,000**
Less Required Contribution by Local Interest	**-36,610,000**
Navigation Aids (U.S. Coast Guard)	**93,000**
TOTAL FEDERAL FIRST COST	**$240,136,000**
NON-FEDERAL FIRST COST	
Dredging	
Berthing Areas (1,890,000 cu. yds. @ $1.04/cu. yd.)	**1,966,000**
Dike Construction (over & above C.E. cost) **5,000,000 cu. yds. @ $0.05/cu. yd.**	**250,000**
Initial Dike Construction	
Dressing & Shaping	**35,000**
Waste Weirs	**34,000**
Revetment	**4,289,000**
SUBTOTAL	**$ 6,134,000**
Contingencies @ 20%	**1,227,000**
Cash Contribution (5% of $284,014,000)	**14,201,000**
Cash Contribution (8.1% of $276,653,000)	**22,409,000**
TOTAL NON-FEDERAL FIRST COST	**43,971,000**

upper 7.4 miles of bay channel, the anchorage area and turning basin would be utilized to construct dikes along the perimeter of the Brookley disposal area and to construct fast land within the northern portion of the disposal area. The remainder of the new work material from the upper bay reach would be transported by hydraulic pipeline dredge to the southern end of the diked disposal area. New work material from the lower bay reach would be loaded on dump scows by a hydraulic cutterhead dredge and transported to the gulf for disposal in deep water. The maintenance material from the upper bay will be transported to the gulf for disposal and the maintenance material from the lower bay channel will be disposed of in the existing sites presently used for maintenance of the lower main bay channel. The gulf disposal sites are the same as shown on Figure 12.

Evaluation and Assessment. As with the preceding alternative, optimization studies were performed to determine the level of development that would maximize net benefits. These studies indicate that maximum net benefits could be achieved from a channel with dimensions commensurate with a 55-foot depth main channel through Mobile Bay. A comparison of annual benefits, annual costs and net benefits for the 45-, 50-, 55- and 60-foot levels of development for the Brookley Expansion Area and Gulf Disposal Plan No. 2 is displayed in Table 7.

TABLE 7

OPTIMIZATION OF BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 2 (MODIFIED)

OCTOBER 1978 PRICE LEVEL

Channel Depth	Annual Benefits	Annual Charges	Net Benefits
45 feet	$12,597,000	$ 9,138,000	$ 3,459,000
50 feet	22,646,000	15,192,000	7,454,000
55 feet	33,130,000	21,965,000	11,165,000
60 feet	38,956,000	34,335,000	4,621,000

The optimum level of development for the Brookley Expansion Area and Gulf Disposal Plan No. 2 (Modified) would provide a channel 57 feet deep and 700 feet wide in the entrance channel and a channel 55 feet deep and 550 feet wide through Mobile Bay. Also, commensurate depths would be provided at the anchorage area opposite McDuffie Island and the turning basin to be provided in that vicinity.

Approximately 1,047 acres of fast land constructed to about +17.5 feet above mean low water would be provided adjacent to the Brookley Industrial Complex. The plan would provide a disposal area for soft new work material dredged from the southern portion of the upper main bay channel. This development is also compatible with the Alabama State Docks' long-range development plan and will provide, on the average, $2,697,000 in annual regional land enhancement benefits. McDuffie Island would not be used to contain dredged material because of its limited capacity and the marsh areas that would be destroyed.

The Brookley Expansion Area and Gulf Disposal Plan No. 2 (Modified) is the most economical of the detailed alternatives that meets the navigation needs of the area. Environmental impacts of this plan would be identical to those of the Brookley Expansion Area and Gulf Disposal Plan No. 1 (Modified) except for the impacts related to disposal of maintenance material from the lower bay. At intervals of two to three years approximately 12,000 acres of lower bay bottom adjacent to the main ship channel would receive dredged maintenance material. This technique is presently employed for maintenance of the existing project. The 55-foot level of development as proposed would increase the average annual quantity of material dredged from the lower bay by about 150,000 cubic yards. Thus, a total of about 2.7 million cubic yards of maintenance material would be disposed adjacent to the channel annually.

The most significant concern about disposal of larger quantities of maintenance material in the lower bay would be associated with the physical fate of the material. Evaluation of previous disposal in the bay indicates that for the period of record, 1960 to 1976, approximately 49,600,000 cubic yards of dredged material were disposed in the lower bay including 13,000,000 cubic yards of material from channel modification. Bathymetric surveys of the disposal areas indicate that there has been a relatively small amount of accumulation of the material. Judging from this information it is expected that the increased quantities of maintenance material would also tend to be redistributed by wind, wave, currents, tidal action, or fisheries activities. As discussed under the "No Action" Plan in this section, studies to date indicate that the present practice of disposal of maintenance material adjacent to the channel results in a relatively minor biological impact, considered to be well within the resiliency of the estuarine system. This plan would result in only a relatively small increase in the present amount of material being deposited into the bay. Further studies would have to be conducted before recommending this alternative. Due to the environmental acceptability of gulf disposal over bay disposal this alternative has been dropped from further study.

Mitigation Measures. (Same as the Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified.)

Implementation Responsibilities. Responsibility for development of this plan is divided between Federal and non-Federal interests in accordance with established policy and guidelines. The Federal Government may construct or improve channels and harbors to meet the requirements of shipping, while non-Federal interests are responsible for terminal facilities, berthing areas, certain other components, and specified items of local cooperation.

The United States would design and prepare detailed plans, dredge the improved gulf and bay channels and turning and anchorage basins, and maintain the improvement to project dimensions, after Congressional authorization and funding.

Local interests would provide all lands, easements and rights-of-way; all relocations and alterations of utilities; all retaining works and stabilization measures required for disposal of dredged material; and depths in all berthing areas commensurate with those provided in related project areas.

Total average annual benefits for the 55-foot plan are evaluated at $33,130,000 including $30,433,000 navigation benefits and $2,697,000 land enhancement benefits. Land enhancement benefits are considered local and the cost allocated to land enhancement is a local responsibility. The benefits are summarized and allocated in Table 8.

TABLE 8

ALLOCATION OF BENEFITS
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 2 (MODIFIED)
OCTOBER 1978 PRICE LEVELS

Type of Benefit	Average Annual Value Total	 General	 Local
Navigation	$30,433,000	$30,433,000	-
Land Enhancement	2,697,000	-	$2,697,000
TOTAL	$33,130,000	$30,433,000	$2,697,000
Percent	100	91.9	8.1

The first cost of general navigation facilities for the 55-foot channel plan considered herein, excluding navigation aids, would be borne jointly by the United States and local interests. The apportionment is based on the ratios of "general" to "local benefits." According to the ratio of general to local benefits derived heretofore, 91.9 percent of the first cost of general navigation facilities would be borne by the Corps of Engineers and 8.1 percent by local interests.

The President, in his June 1978 water policy message to Congress, proposed several changes in cost-sharing for water resources projects to allow states to participate more actively in project implementation decisions. These changes include a cash contribution from benefiting states of 5 percent of first costs of construction assigned to nonvendible project purposes and 10 percent of costs assigned to vendible project purposes.

Application of this policy to this Mobile Harbor plan requires a contribution from the State of Alabama of an estimated $14,201,000 in cash (5 percent of $284,014,000 total estimated project first costs assigned to nonvendible project purposes, based on October 1978 price levels). Other items of local cooperation would not be affected by this additional requirement.

Estimated first costs, shown in Table 9, are based upon October 1978 dollar values. This table includes advance engineering and design costs, and the contributions required by local interest.

The presently estimated additional Federal annual maintenance is $1,363,000 which includes annual costs to the U.S. Coast Guard of $4,000 for maintenance of navigation aids. The estimated non-Federal average annual maintenance is $304,000.

GULF DISPOSAL PLAN NO. 1

Plan Description. The Gulf Disposal Plan No. 1 would enlarge the channels and construct the anchorage area and turning basin, as

TABLE 9

ESTIMATE OF FIRST COST
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 2 (MODIFIED)
OCTOBER 1978 PRICE LEVELS

FEDERAL FIRST COST	
Dredging	
Upper Bay Reach (above Theodore) 63,400,000 cu. yds. @ $1.04/cu. yd.	$ 65,936,000
Lower Bay Reach 58,654,000 cu. yds. @ $1.28/cu. yd.	75,077,000
Entrance Channel 19,019,000 cu. yds. @ $1.75/cu. yd.	33,283,000
Mooring Dolphins (16 @ $54,142 ea.)	866,000
SUBTOTAL	$175,162,000
Contingencies @ 20%	35,032,000
Engineering & Design @ 3%	6,306,000
Supervision & Administration @ 3%	6,495,000
Interest during Construction (7 yrs. @ 6-7/8%)	53,658,000
SUBTOTAL	$276,653,000
Less Required Contribution by Local Interest	-36,610,000
Navigation Aids (U.S. Coast Guard)	93,000
TOTAL FEDERAL FIRST COST	240,136,000
NON-FEDERAL FIRST COST	
Dredging	
Berthing Areas (1,890,000 cu. yds. @ $1.04/cu. yd.)	1,966,000
Dike Construction (over & above C.E. cost) 5,000,000 cu. yds. @ $0.05/cu. yd	250,000
Initial Dike Construction	
Dressing & Shaping	35,000
Waste Weirs	34,000
Revetment	4,289,000
SUBTOTAL	$ 6,134,000
Contingencies @ 20%	1,227,000
Cash Contribution (5% of $284,014,000)	14,201,000
Cash Contribution (8.1% of $276,653,000)	22,409,000
TOTAL NON-FEDERAL FIRST COST	43,971,000
TOTAL ESTIMATED FIRST COST	$284,107,000

do the Brookley Expansion plans. This plan differs in that new work and maintenance material from the upper bay would be transported by dump scows and disposed of in the deep water of the gulf. The diked bay disposal area would not be constructed. New work and maintenance from the lower bay would also be disposed of in the deep water of the gulf. The plan would reduce the present net rate of sedimentation in the bay and would prolong the bay's estuarine life; however, this plan does not provide any fast land development for future port development in the upper bay.

Evaluation and Assessment. As with the preceding two alternatives, optimization studies were performed to determine the level of development that would maximize net benefits. These studies also identified the 55-foot level of development for the main bay channel as the optimum plan. A comparison of different levels of development for the Gulf Disposal Plan No. 1 is displayed in Table 10.

TABLE 10

OPTIMIZATION OF GULF DISPOSAL PLAN NO. 1
OCTOBER 1978 PRICE LEVEL

Channel Depth	Annual Benefits	Annual Charges	Net Benefits
45 feet	$11,067,000	$13,463,000	$-2,396,000
50 feet	20,644,000	18,054,000	2,590,000
55 feet	30,433,000	25,787,000	4,646,000
60 feet	35,260,000	33,784,000	1,476,000

The Gulf Disposal Plan No. 1 varies from the preceding plans for constructing areas in upper Mobile Bay for dredged material disposal in that the plan provides for disposal of all the new work and maintenance in the deep water of the Gulf of Mexico. Other aspects of the plan in regard to the channel construction would be the same.

The plan would involve disposing 143 million cubic yards of new work material and an average of 4.7 million cubic yards of maintenance material annually in the gulf. The optimum level of development for this plan could be constructed and maintained for $25,787,000 annually. The plan would produce $4,646,000 in net benefits annually.

The physiochemical-biological interactive effects of disposal of all the material in the gulf would be similar but to a greater degree than that discussed for the Brookley Expansion plans. These increased quantities of material to be dumped offshore under this plan would also be disposed of in areas 1 and 2 (Figure 12), as with the other plans including gulf disposal. These areas will require further evaluations and study to determine their acceptability. More detailed studies for the plan could be performed in preconstruction planning when more exact quantities of dredged material and definite locations of disposal areas would be known.

Based on available data, general effects of disposal in the open gulf are considered less detrimental than those resulting from disposal within Mobile Bay. However, more energy would be required to implement this plan than any other channel deepening alternative considered, and the land enhancement benefits would be foregone.

Mitigation Measures. (Same as the Brookley Expansion Area and Gulf Disposal Plan No. 1 and 2, Modified, except the bridging of US Highway 90, opening of McDuffie fill and establishing 70 acres of wetlands would not be implemented.)

Implementation Responsibilities. Responsibility for development of this plan is divided between Federal and non-Federal interests in accordance with established policy and guidelines. The Federal Government may construct or improve channels and harbors to meet the requirements of shipping, while non-Fedreal interests are responsible for terminal facilities, berthing areas, certain other components, and specified items of local cooperation.

The United States would design and prepare detailed plans, dredge the improved gulf and bay channels and turning and anchorage basins, and maintain the improvement to project dimensions, after Congressional authorization and funding.

Local interests would provide all lands, easements and rights-of-way; all relocations and alterations of utilities; all retaining works and stabilization measures required for disposal of dredged material; and depths in all berthing areas commensurate with those provided in related project areas.

The first cost of general navigation facilities for the 55-foot channel plan considered herein, including navigation aids, would be borne by the United States.

The President, in his June 1978 water policy message to Congress, proposed several changes in cost-sharing for water resources projects to allow states to participate more actively in project implementation decisions. These changes include a cash contribution from benefiting states of 5 percent of first costs of construction assigned to nonvendible project purposes and 10 percent of costs assigned to vendible project purposes.

Application of this policy to this Mobile Harbor plan requires a contribution from the State of Alabama of an estimated $16,880,000 in cash (5 percent of $337,596,000 total estimated project first costs assigned to nonvendible project purposes, based on October 1978 price levels). Other items of local cooperation would not be affected by this additional requirement.

Estimated first costs, shown in Table 11, are based upon October 1978 dollar values. This table includes advance engineering and design costs, and the contributions required by local interests.

The presently estimated additional Federal annual maintenance is $1,453,000 which includes annual costs to the U.S. Coast Guard of $4,000 for maintenance of navigation aids. The estimated non-Federal average annual maintenance is $257,000.

CHANNEL WIDENING (Least Environmentally Damaging Plan)

Plan Description. This alternative plan would forego any channel deepening, however, it would consider widening the existing main bay channel 50 feet to reduce traffic delays, provide an additional increment of safety and modify existing dredged disposal techniques to provide for removing all maintenance dredged material to the gulf for disposal. All new work dredged material would also be disposed of in the gulf (see Figure 12).

Evaluation and Assessment. This plan induces no transportation savings from deeper draft vessels but eliminates some traffic delays within the bay and makes a positive environmental contribution to improving circulation in the upper bay and no longer disturbs the bay bottom adjacent to the ship channel by receiving annual maintenance material. The plan reduces the sedimentation of the bay by removing to the gulf approximately 4.2 million cubic yards of dredged maintenance material each year. This volume of maintenance material includes the maintenance of the existing project.

The additional annual charges for this alternative equal $1,395,000. Compared to a reduction in traffic delay costs of approximately $4,884,000, the channel widening plan has a benefit-to-cost ratio of 3.5 and $3,489,000 net benefits.

TABLE 11

ESTIMATE OF FIRST COST
GULF DISPOSAL PLAN NO. 1
OCTOBER 1978 PRICE LEVEL

FEDERAL FIRST COST	
Dredging	
Upper Bay Reach (above Theodore) 63,400,000 cu. yds. @ $1.68/cu. yd.	$106,512,000
Lower Bay Reach 58,654,000 cu. yds. @ $1.28/cu. yd.	75,077,000
Entrance Channel 19,019,000 cu. yds. @ $1.75/cu. yd.	33,283,000
Mooring Dolphins (16 @ $54,142 ea.)	866,000
SUBTOTAL	$215,738,000
Contingencies @ 20%	43,148,000
Engineering & Design @ 3%	7,767,000
Supervision & Administration @ 3%	8,000,000
Interest during Construction (7 yrs. @ 6-7/8%)	59,040,000
SUBTOTAL	$333,693,000
Less Required Contribution by Local Interest	-16,880,000
Navigation Aids (U.S. Coast Guard)	93,000
TOTAL FEDERAL FIRST COST	$316,906,000
NON-FEDERAL FIRST COST	
Dredging	
Berthing Areas (1,890,000 cu. yds. @ $1.68/cu. yd.)	3,175,000
Contingencies @ 20%	635,000
Cash Contribution (5% of $337,596,000)	16,880,000
TOTAL NON-FEDERAL FIRST COST	$ 20,690,000
TOTAL ESTIMATED FIRST COST	$337,596,000

Model studies indicate that enlargement of the channel is the dominant cause of salinity changes in the bay. In view of the above, the less detrimental effects of dredged material disposal, improved safety conditions for ships and retarding the filling of the bay, the Channel Widening Plan is regarded as the least environmentally damaging plan.

Mitigation Measures. Mitigation measures for this plan, based on available information, are not warranted; however, there are EQ measures that have previously been addressed as mitigation measures that have positive environmental value that could be included in the Channel Widening Plan.

Studies indicated that along the main channel between a point on the same latitude as the mouth of Dog River to a point about 2 miles to the north, approximately 4.3 million cubic yards of material would have to be removed to eliminate the ridges between the channel and adjacent bay bottom. This material could be placed by hydraulic pipeline dredge into the existing depressions located in the upper bay, thereby reducing the tendency of concentrated low oxygen water developing in the depressions. Preliminary studies indicate this measure would cost approximately $6,000,000 to implement. This equates to an average annual cost of $414,000. In view of the cost, uncertainty of existing impacts and benefits from measures such as this, model studies should be performed to more accurately determine the effects on circulation prior to implementing such measure. These model studies may show that creating openings in the causeway or other measure may achieve more desirable and effective results for less costs.

The establishment of additional oyster beds in Bon Secour Bay is another environmental measure that is considered desirable. However, this too depends on very accurate assessments of any changes to the circulation and resultant salinity variations that might be created by implementing any structural alternative. Model studies could furnish the needed data to investigate this need further.

Implementation Responsibilities. Responsibility for development of this plan is divided between Federal and non-Federal interests in accordance with established policy and guidelines. The Federal Government may construct or improve channels and harbors to meet the requirements of shipping, while non-Federal interests are responsible for terminal facilities, berthing areas, certain other components, and specified items of local cooperation.

The United States would design and prepare detailed plans, dredge the improved gulf and bay channels and turning and anchorage basins, and maintain the improvement to project dimensions, after Congressional authorization and funding.

The first cost of general navigation facilities for the Channel Widening Plan considered herein, including navigation aids, would be borne by the United States.

The President, in his June 1978 water policy message to Congress, proposed several changes in cost-sharing for water resources projects to allow states to participate more actively in project implementation decisions. These changes include a cash contribution from benefiting states of 5 percent of first costs of construction assigned to nonvendible project purposes and 10 percent of costs assigned to vendible project purposes.

Application of this policy to this Mobile Harbor plan requires a contribution from the State of Alabama of an estimated $940,000 in cash (5 percent of $18,798,000 total estimated project first costs assigned to nonvendible project purposes, based on October 1978 price levels). Other items of local cooperation would not be affected by this additional requirement.

Estimated first costs, shown in Table 12, are based upon October 1978 dollar values. This table includes advance engineering and design costs, and the contributions required by local interests.

The presently estimated additional Federal annual maintenance is $54,000. There is no increase in the non-Federal annual maintenance.

PUBLIC VIEWS

On 31 July 1979 a final public meeting was held to present the results of the study. Notices of the public meeting were furnished the United States Senators and Representatives from the area, Federal and State agencies, city and county authorities, and interested organizations and individuals. General support for the selected plan was received from the U.S. Congressmen, Department of Transportation and Department of Commerce (Maritime Administration). Federal agencies such as the Department of Interior, Environmental Protection Agency and Department of Commerce (National Oceanic and Atmospheric Administration) expressed a general objection to placing dredged material adjacent to the Brookley shoreline and creating a fast land area.

A considerable majority of those represented at the meeting were in favor of the selected plan for Mobile Harbor. However, several environmental groups and local citizens spoke or wrote letters expressing concern or opposition to the selected plan. Concerns included the necessity or desirability of deepening Mobile Ship Channel and the potential environmental degradation of the bay with

TABLE 12

ESTIMATE OF FIRST COST
CHANNEL WIDENING PLAN
OCTOBER 1978 PRICE LEVEL

FEDERAL FIRST COST	
Dredging	
Upper Bay Channel to Theodore	
1,837,000 cu. yds. @ $2.50/cu. yd.	$ 4,593,000
Lower Bay Reach	
5,070,400 cu. yds @ $2.00/cu. yd.	10,141,000
SUBTOTAL	$14,734,000
Contingencies @ 20%	2,947,000
SUBTOTAL Construction	$17,681,000
Engineering & Design @ 3%	530,000
Supervision and Administration @ 3%	546,000
TOTAL Construction	$18,757,000
Non-Federal Cash Contribution	-940,000
TOTAL Cost to Corps of Engineers	$17,817,000
Aids to Navigation (U.S. Coast Guard)	41,000
TOTAL Federal First Cost	$17,858,000
NON-FEDERAL FIRST COST	
Non-Federal Cash Contribution (5% of $18,798,000)	$ 940,000

particular emphasis on the Brookley Expansion Area. Environmental groups in general feel that if channel enlargement is necessary, then the dredged material should all be transported to an approved disposal site in the Gulf of Mexico.

Appendix 3 contains letters and responses from Federal and State agencies, and concerned local groups and individuals. A transcript of the public meetings was prepared and is available at the Mobile District Office.

COMPARISON OF DETAILED PLANS

The selection of the best plan to solve the problems and meet the needs of the study area results from a comparison of alternative plans. This comparison is based on the effect assessment, the contributions to the four accounts--National Economic Development (NED), Environmental Quality (EQ), Regional Development (RD), and Social Well-Being (SWB)--and responsiveness to stated evaluation criteria.

SYSTEM OF ACCOUNTS

Federal criteria for water resources planning establish the need for an allocation of significant beneficial and adverse effects of considered plans in terms of the four basic accounts--NED, EQ, RD, and SWB. A display of the effects in terms of the system of accounts (SA) is also required.

Contributions of the plans in detail to the four accounts are presented in summary form in Tables 13A through 13E.

The SA displays information concerning the location of beneficial or adverse effects. As a minimum, one region, such as a city or county, and the rest of the nation must be shown. In the Mobile report, three regions are shown for which effects have been identified. They are: (1) the study area, consisting of Mobile and Baldwin Counties and the immediate project area within and adjacent to Mobile Bay; (2) a larger area affected by the project which is further subdivided as the primary tributary area for commodities handled at the port and the Gulf of Mexico, including the Mississippi Sound; and (3) the rest of the nation.

Throughout the display, there will be numerical footnotes and asterisks. The numerical notations refer to information associated with the timing, uncertainty, exclusivity, and actuality of the effect described. The asterisks note items included in those specifically required by Section 122, PL 91-611. Below is an index of the notations.

TIMING

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years) following implementation.

UNCERTAINTY

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less than 10%.

EXCLUSIVITY

7. Overlapping entry; fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

ACTUALITY

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because necessary additional actions are lacking.

TABLE 13A
SYSTEM OF ACCOUNTS
Plan: "NO ACTION"

Effects	Location of Impacts		
	Study Area	Larger Area	Rest of The Nation
1. National Economic Development			
a. Positive	No direct beneficial effects on a local or national scale.		
b. Negative	No direct commitment of local or national resources.		
2. Environmental Quality			
a. EQ Enhanced	No enhancement of environmental resources.		
b. EQ Degraded	Disposal of maintenance material from the bay and bar channels would continue to disrupt the benthic communities at the disposal sites. Disposal mounds and their possible effects on circulation would continue to persist in the upper bay.		
c. EQ Destroyed	No environmental resources would be irretrievably lost as a result of dredging the bay or bar channels. Utilization of the upper harbor disposal areas would eliminate 135 acres of reestablished prime marshland.		
3. Social Well-Being			
a. Beneficial	Health, safety and community well-being would be unaffected; educational, cultural and recreation opportunities would not be influenced.		
b. Adverse	No unfavorable effects.		
4. Regional Development			
a. Beneficial	No significant effects on income, employment or economic growth of the region.		
b. Adverse	No unfavorable effects.		

TABLE 13B

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 1 (Modified) 55x550-ft. Main Channel

Accounts	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
1. National Economic Development				
a. Beneficial Impacts				
(1) Annual transportation savings				$30,433,000 (2 ,6,9)
(2) Land Enhancement	$2,697,000 (2,6,9)			
b. Adverse Impacts				
(1) Project first			$43,971,000 **	$240,136,000
(2) Annual Charges			$ 1,479,000 **	$ 18,549,000
c. B/C Ratio (total)				1.5
			NED ACCOUNT **Non-Federal costs allocated to the state. Includes the additional 5% required by Pres. Water Policy.	

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan
2. Impact is expected with 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13B .
SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 1 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
[a]EQ Account				
a. Beneficial Impacts				
(1) Man-made resources*	Significantly enhance industrial & port facilities (2,6,10)			
(2) Natural resources*	Opportunity exists for improving circulation in the upper bay below the disposal area and north of the Theodore Channel by discontinuing existing methods of disposing maintenance material alongside the main ship channel.			
b. Adverse Impacts				
(1) Air Quality *	The major factor is the number & type of industry(2,5,10)			
2) Noise Level Changes*	Significant effects due to increased port facilities(2,5,10)			

11. Impact will not occur because necessary additional actions are lacking.

Section 122 * Items required by Sec. 122 & ER 1105-2-105.

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less than 10%.

Exclusively

7. Overlapping entry; fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.

TABLE 13B

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 1 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(3) Water Quality*	Minor release of heavy metal at dredging and disposal sites. Assimilative capacity of Mobile River will be slightly reduced. (1,6,9)			
(4) Natural Resources*	Benthic communities disrupted due to placement of material in the Gulf disposal sites and in nearby areas surrounding proposed upper bay fill area. Channel widening would decrease benthic production in approx. 700 acres of the bay (1,6,9)			

Index of footnotes:

__Timing__

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

__Uncertainty__

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

__Exclusively__

7. Overlapping entry; fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

__Actuality__

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

__Section 122__ *Items required by Sec.122 & ER 1105-2-105.

TABLE 13B

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 1 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(5) Esthetic Values*	Adverse visual and odor effects associated with increased industrial and commercial development and dredging (1,5,9)			
(6) Salinity Changes	Denser saltwater will be introduced up into Mobile Bay due to larger ship channel (1,6,9)			
c. EQ Destroyed Natural Resources*	1,710 Acres of bay bottom converted to fastland.			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13B

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No.1 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
3. SWB Account				
a. Beneficial Impacts				
(1.) Property Values	None			
(2) Public facilities and services*	Additional land made available for port facility development (2,6,9)			
b. Adverse Impacts				
(1) Relocation of People	Possible relocation of housing adjacent to proposed fill area (1,5,9)			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13B

SYSTEM OF ACCOUNTS

PLAN: Brockley Expansion Area and Gulf Disposal
Plan No. 1 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(2) Relocation of business*	No significant effects (3,5,10)			
(3) Relocation of farms*	No effects			
(4) Community Growth	No significant effects (3,5,10)	No significant effects (3,5,10)		
(5) Community Cohesion	Implementation of this plan would be in line with stated community economic goals. Community cohesion as it now exists would not be disrupted.			

Index of footnotes:

Timing
1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty
4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively
7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality
9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13B

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No.1 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
4. RD Account a. Beneficial Impacts				
(1) Regional Growth*	This plan would create a minor employment growth. (3,6,10)	Enhance businesses and employment. (3,5,10)	Enhance commercial businesses, farming & industry (3,5,10)	
(2) Tax Changes*	Local money for construction & maintenance (1,5,9)	Commerce & Employment would affect tax revenues. (3,5,10)	Commerce would affect tax revenues. (3,5,10)	Commerce woul affect Federal tax revenues (3,5,10)
(3) Employment*	Minor increase in business & industry related to the port would result in increased employment (3,5,10)	Increased employment (3,5,10)		
b. Adverse	No unfavorable regional effects.			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected withi 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13C

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 2 (Modified) 55x550 ft. Main Channel

	LOCATION OF IMPACTS			
Accounts	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
1. National Economic Development				
a. Beneficial Impacts				
(1) Annual transportation savings				$30,433,000 (2,6,9)
(2) Land Enhancement	$2,697,000 (2,6,9)			
b. Adverse Impacts				
(1) Project first cost			$43,971,000**	$240,136,000
(2) Annual charges			$ 3,479,000**	$ 18,488,000
c. B/C Ratio (total)			----	1.5
			NED ACCOUNT **Non-Federal costs allocated to the state. Includes the additional 5% required by President's water policy	

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13C .
SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 2 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
2. EQ Account a. Beneficial Impacts				
(1) Man-made resources*	Significantly enhance industrial & port facilities (2,6,10)			
(2) Natural resources*	Opportunity exists for improving circulation in the upper bay below the disposal area and north of the Theodore Channel by discontinuing existing methods of disposing maintenance material alongside the main ship channel.			
b. Adverse Impacts (1) Air Quality *	The major factor is the number & type of industry(2,5,10)			
(2) Noise Level Changes*	Significant effects due to increased port facilities(2,5,10)			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less than 10%.

Exclusively

7. Overlapping entry; fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions * are carried out during implementation.
11. Impact will not occur because necessary additional actions are lacking.

Section 122 * Items required by Sec. 122 & ER 1105-2-105.

TABLE 13C

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal Plan
No. 2 (Modified) 55x550-ft. Main Channel

LOCATION OF IMPACTS

	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
3. Water Quality*	Minor release of heavy metal at dredging and disposal sites. Assimilative capacity of Mobile River will be slightly reduced (1,6,9)			
4. Natural Resources*	Benthic communities disrupted due to placement or dredged material in the gulf disposal sites, lower bay, and in nearby areas surrounding proposed upper bay fill area. Channel widening would decrease benthic productivity in approx. 700 acres of the bay (1,6,9)			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 30%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13C

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 2 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
5. Esthetic Values*	Adverse visual and odor effects associated with increased industrial and commercial development and dredging.(1,5,9)			
6. Salinity Changes	Denser saltwater will be introduced up into Mobile Bay due to larger ship channel. (1,6,9)			
C. EQ Destroyed Natural Resources	1,710 Acres of bay bottom converted to fastland			

Index of footnotes:
Timing
1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)
Uncertainty
4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.
Exclusively
7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.
Actuality
9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.
Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13C

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 2 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
3. SWB Account				
a. Beneficial Impacts.				
(1) Property Values	None			
(2) Public facilities and services*	Additional land made available for port facility development (2,6,9)			
b. Adverse Impacts				
(1) Relocation of people	Possible relocation of housing adjacent to proposed fill area (1,5,9)			

Index of footnotes:

Timing

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Uncertainty

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5. The uncertainty is between 10% and 50%.
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Exclusively

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8. Overlapping entry; not fully monetized in NED account.

Actuality

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Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13C

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 2 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(2) Relocation of business*	No significant effects (3,5,10)			
(3) Relocation of farms*	No effects			
(4) Community growth	No significant effects (3,5,10)	No significant effects (3,5,10)		
(5) Community Cohesion	Implementation of this plan would be in line with stated community economic goals. Community cohesion as it now exists would not be disrupted.			

Index of footnotes:
Timing
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3. Impact is expected in a longer time frame (15 or more years following implementation.)
Uncertainty
4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.
Exclusively
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8. Overlapping entry; not fully monetized in NED account.
Actuality
9. Impact will occur with implementation.
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11. Impact will not occur because neccessary additional actions are lacking.
Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13C

SYSTEM OF ACCOUNTS

PLAN: Brookley Expansion Area and Gulf Disposal
Plan No. 2 (Modified) 55x550-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
4. RD Account a. Beneficial Impacts				
(1) Regional Growth*	This plan would create a minor employment growth (3,6,10)	Enhance businesses and employment(3, 5,10)	Enhance commercial businesses, farming &industry (3,5,10)	
(2) Tax Changes*	Local money for construction & maintenance(1,5,9)	Commerce & employment would affect tax revenues.(3,5,10)	Commerce would affect tax revenues (3,5,10)	Commerce would affect Federal tax revenues(3,5, 10)
(3) Employment*	Minor increase in business & industry related to the port would result in increased employment (3,5,10)	Increased employment (3,5,10)		
b. Adverse	No unfavorable regional effects			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13D

SYSTEM OF ACCOUNTS

PLAN: Gulf Disposal

Accounts	LOCATION OF IMPACTS Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
1. National Economic Development				
a. Beneficial Impacts				
(1) Annual transportation savings				$30,433,000 (2,6,9)
b. Adverse Impacts				
(1) Project first cost			$20,690,000**	$316,906,000
(2) Annual charges			$ 1,733,000**	$ 24,054,000
c. B/C Ratio (total)				1.2
			NED ACCOUNT **Non-Federal costs allocated to the state. Includes the additional 5% required by President's water policy	

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry; fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13D.

SYSTEM OF ACCOUNTS

PLAN: Gulf Disposal

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
2. EQ Account a. Beneficial Impacts				
(1) Man-made resources*	No significant compared to "no action"			
(2) Natural Resources*	Circulation in the upper bay improved by discontinuing existing methods of disposing maintenance material alongside the main ship channel(1,6,9)			
b. Adverse Impacts				
(1) Air Quality*	No significant impact compared to "no action"			
(2) Noise level Changes*	Minor increase due to construction activity (1,5,9)			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
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6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

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TABLE 13D

SYSTEM OF ACCOUNTS

PLAN: Gulf Disposal

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(3) Water Quality*	Minor release of heavy metal at dredging and disposal sites (1,6,9)			
(4) Natural Resources*	Benthic communities disrupted due to placement of dredged material in the gulf disposal sites. Channel widening would decrease benthic productivity in approx. 700 acres of the bay (1,6,9)			
(5) Esthetic Values*	Adverse visual effects associated with dredging (1,5,9)			
(6) Salinity Changes	Denser saltwater will be introduced up into Mobile Bay due to larger ship channel (1,6,9)			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)

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Actuality

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TABLE 13D

SYSTEM OF ACCOUNTS

PLAN: Gulf Disposal

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
c. EQ Destroyed	No resources will be irretrievably lost.			
3. SWB Account				
a. Beneficial Impacts				
(1) Property Values	No significant impact			
(2) Public facilities and services*	Increase in services due to lower transportation costs (1,6,10)			
b. Adverse Impacts				
(1) Relocation of People	No impact			

Index of footnotes:

Timing

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TABLE 13D

SYSTEM OF ACCOUNTS

PLAN: Gulf Disposal

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(2) Relocation of business*	No effects			
(3) Relocation of farms*	No effects			
(4) Community Growth	Insignificant impact			
(5) Community Cohesion	Insignificant Impact			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.

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Exclusively

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Actuality

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TABLE 13D

SYSTEM OF ACCOUNTS

PLAN: Gulf Disposal

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
4. RD Account a. Beneficial Impacts (1) Regional Growth*	This plan would create a minor employment growth (3,6,10)	Enhance businesses and employment(3,5,10)	Enhance commercial businesses, farming & industry (3,5,10)	
(2) Tax Changes*	Local money for construction & maintenance (1,5,9)	Commerce & employment would affect tax revenues(3,5,10)	Commerce would affect tax revenues (3,5,10)	Commerce would affect Federal tax revenues. (3,5,10)
(3) Employment*	Minor increase in business & industry related to the port would result in increased employment.	Increased employment (3,5,10)		
b. Adverse	No unfavorable regional effects			

Index of footnotes

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)

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Exclusively

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8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
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11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13E

SYSTEM OF ACCOUNTS

PLAN: Channel Widening (Least Environmentally Damaging Plan) 40-x450-ft. Main Channel

Accounts	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
1. National Economic Development				
a. Beneficial Impacts				
(1) Annual transportation savings				$4,884,000 (2,6,9)
b. Adverse Impacts				
(1) Project first cost			$940,000**	$17,858,000
(2) Annual Charges			$ 67,000**	$ 1,328,000
c. B/C Ratio (total)			-----	3.5
			NED ACCOUNT **Non-Federal costs allocated to the state. Includes the additional 5% required by President's water policy.	

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13E

SYSTEM OF ACCOUNTS

PLAN: Channel Widening (Least environmentally damaging plan) 40-x450-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
2. EQ Account				
a. Beneficial Impacts				
(1) Man-made resources*	No effect			
(2) Natural resources*	Circulation in the upper bay improved by discontinuing existing methods of disposing maintenance material alongside the main ship channel(1,6,9)			
b. Adverse Impacts				
(1) Air Quality*	No effect			
(2) Noise level Changes*	Minor increase due to construction activity (1,5,9)			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

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8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13E

SYSTEM OF ACCOUNTS

PLAN: Channel widening (Least environmentally damaging plan) 40-x450-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(3) Water Quality*	Minor release of heavy metal at dredging and disposal sites (1,6,9)			
(4) Natural Resources*	Benthic communities disrupted due to placement of material at gulf disposal site. Channel widening would decrease benthic productivity in approx. 350 acres of the bay. (1,6,9)			
(5) Esthetic Values*	Adverse visual effects associated with dredging (1,5,9)			
(6) Salinity Changes	More saltwater will be introduced up into Mobile Bay due to larger channel (1,6,9)			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry; fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

TABLE 13E

SYSTEM OF ACCOUNTS

PLAN: Channel Widening(Least environmentally damaging plan) 40-x450-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
c. EQ Destroyed	No resources will be irretrievably lost.			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
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3. Impact is expected in a longer time frame (15 or more years following implementation.)

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8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
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11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13E

SYSTEM OF ACCOUNTS

PLAN: Channel Widening (Least environmentally damaging plan) 40-x450-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
3. SWB Account				
a. Beneficial Impacts				
(1) Property Values	No impact			
(2) Public facilities and services*	Increase in services due to lower transportation costs (1,6,10)			
b. Adverse Impacts				
(1) Relocation of People	No impact			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13E

SYSTEM OF ACCOUNTS

PLAN: Channel Widening (Least environmentally damaging plan) 40-x450-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
(2) Relocation of business*	No impact			
(3) Relocation of farms*	No impact			
(4) Community Growth	No impact			
(5) Community Cohesion	No impact			

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

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7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because neccessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

TABLE 13B

SYSTEM OF ACCOUNTS

PLAN: Channel Widening (Least environmentally damaging plan) 40-x450-ft. Main Channel

	LOCATION OF IMPACTS			
	Within the immediate planning area	Within the rest of the study area (SMSA)	Within a larger area affected by the plan (BEA)	Within the rest of the nation
4. RD Account a. Beneficial Impacts (1) Regional Growth*	Minor employment growth.(3,6,10)	Minor enhancement of businesses and employment (3,5,10)	Minor enhancement of commercial businesses, farming& industry (3,5,10)	
(2) Tax Changes*	Local money for construction & maintenance(1,5,9)	Commerce & employment would affect tax revenues.(3,5,10)	Commerce would affect tax revenues (3,5,10)	Commerce would affect Federal tax revenues (3,5,10)
(3) Employment*	Minor increase in business & industry related to the port would result in increased employment (3,5,10)	Minor increase (3,5,10)		

Index of footnotes:

Timing

1. Impact is expected to occur prior to or during implementation of the plan.
2. Impact is expected within 15 years following plan implementation.
3. Impact is expected in a longer time frame (15 or more years following implementation.)

Uncertainty

4. The uncertainty associated with the impact is 50% or more.
5. The uncertainty is between 10% and 50%.
6. The uncertainty is less 10%.

Exclusively

7. Overlapping entry;fully monetized in NED account.
8. Overlapping entry; not fully monetized in NED account.

Actuality

9. Impact will occur with implementation.
10. Impact will occur only when specific additional actions are carried out during implementation.
11. Impact will not occur because necessary additional actions are lacking.

Section 122 *Items required by Sec.122 & ER 1105-2-105.

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COMPARISON OF DETAILED PLANS

The comparisons described in the preceding paragraphs yield the following conclusions regarding the five alternatives under consideration.

- "No Action." This plan makes no positive contributions to any account. Therefore, in comparison to the structural alternatives, it foregoes any NED benefits resulting from navigation savings and any EQ benefits resulting from removing sediments from the upper bay area. Also, because it solves no problems and meets no needs, the plan is not desired by local navigation interests and fails to meet the tests of acceptability.

- Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified. This plan addresses the navigation problems, fits the long-range port development goals of the Alabama State Docks Department, and eliminates all future disposal of dredged maintenance material in the bay.

- Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified, (NED). This plan contributes mainly to the NED account, and it is superior to all others when compared on the basis of net benefits. The environmental problems described earlier are slightly greater than other structural plans, however, this plan is considered to have general acceptability because it addresses the navigation problems and fits the long-range port development goals of the Alabama State Docks Department.

- Gulf Disposal Plan No. 1. Like the Brookley Expansion plans, this plan addresses the navigation problems in that it provides the same channel design. However, this plan does not provide for an area that can be utilized for future port expansion. The plan addresses the environmental problems of disposal of dredged material in the bay and is considered to have general acceptability.

- Channel Widening (Least Environmentally Damaging Plan). While the other structural alternatives make positive contributions primarily to the NED account, this plan makes a significant contribution to the EQ account. The Channel Widening Plan was retained for further consideration because it had acceptability even though it did not satisfy the planning objectives as well as the other structural alternative.

The benefit/cost ratios of the considered structural plans are exhibited below for comparison.

Plan	B/C Ratio	Net Benefits
Brookley Expansion Area and Gulf Disposal Plan No. 1 (Modified)	1.5	$11,102,000
Brookley Expansion Area and Gulf Disposal Plan No. 2 (Modified)	1.5	11,163,000
Gulf Disposal Plan No. 1	1.2	4,646,000
Channel Widening	3.5	3,489,000

Comparison of the Brookley Expansion Area and Gulf Disposal Plans No. 1 and 2, Modified, and the Gulf Disposal Plan No. 1 reveals they contribute essentially similar enhancement benefits. The benefits for the Channel Widening Plan were gained entirely from the reduction in traffic delays in the main bay channel.

RATIONALE FOR DESIGNATION OF NED PLAN

Traditional methods for channel modification in Mobile Bay were developed on the basis of economic efficiency and considered open-water disposal of all the dredged disposal material in the bay. A plan such as this would maximize NED efficiency, however, this plan was dropped from consideration since current standards do not consider it a viable or acceptable alternative. The alternative plan that was retained that maximizes NED efficiency is the Brookley Expansion Area and Gulf Disposal Plan No. 2.

RATIONALE FOR DESIGNATION OF LEAST ENVIRONMENTALLY DAMAGING PLAN

The environmental objective of the study was to maintain and enhance EQ. A number of EQ measures have been developed that will have positive contributions to this EQ objective. A plan that would only modify the existing maintenance practice of disposing in open-bay water adjacent to the main bay channel and provide no enlargement to the channel would have a net positive contribution to Mobile Bay and satisfy an EQ objective by enhancing the bay bottom. This plan was further expanded to provide for removing the material from the ridges along the upper reach of the main ship channel, filling low oxygen depressions, establishing oyster beds, nourishing the Dauphin Island beaches, opening the U.S. Highway 90 causeway to improve circulation, regulating flows in the Mobile Delta, and opening the fill connecting McDuffie Island. The above EQ measures were combined with a plan to widen the main bay channel that addressed economic efficiency and safety. It is questionable whether the Channel Widening Plan would result in positive net environmental impacts, therefore, it is considered the least environmentally damaging alternative.

RATIONALE FOR SELECTED PLAN

Following the foregoing comparison, a selection was made between the structural plans. Considerations which led to the selection of one plan over the other are as follows:

- Although the Channel Widening Plan makes a contribution to the EQ account by the removal of dredged material from the upper bay and places it in a less detrimental gulf disposal area, the plan foregoes all transportation savings from deeper draft vessels by limiting the depth to existing dimensions. Although this plan is economically efficient it does not meet the major port need for deeper channels.

- Disposition of dredged maintenance material in the lower bay appears to have few or no permanent detrimental effects on the bay; however, this disposal technique has received considerable objections from environmental interests.

- Construction of a disposal area in the upper bay not only produces regional economic benefits for land enhancement but provides significant savings in disposal of new work dredged material. The additional cost for implementing the Gulf Disposal Plan is not considered justified.

- A judgement was made that the additional cost for modifying the dredged maintenance material disposal for the existing project would be offset by environmental gains and benefits of the existing commodity movements. Based on available data, offshore disposal in the area 2 of the Gulf of Mexico was selected as the best disposal site for the existing and future channel maintenance material. This option is the most conservative option to show sound feasibility for selecting a plan of development; however, ongoing Corps of Engineers studies and 404(b) evaluations may indicate open-water bay disposal areas more suitable in view of environmental and economic impacts.

RECOMMENDED PLAN

In view of overall evaluation, design criteria and planning objectives, the plan defined herein as the Brookley Expansion Area and Gulf Disposal Plan No. 1 (Modified) is considered the best plan for implementation. This plan, in combination with other structural endeavors to improve water quality that were identified in the report as requiring additional model studies, will best solve existing problems and meet the needs of the study area.

The recommended plan was analyzed in light of the requirements set forth in Section 150 of the Water Resources Development Act of 1976 (Public Law 94-587) to determine the feasibility of establishing wetland areas by using disposal material. About 70 acres of wetlands will be created for mitigation. The establishment of additional wetlands as provided for in Section 150 is currently being studied under the Mobile Harbor operation and maintenance program.

Fill of any wetland or water areas for expansion of port facilities is environmentally undesirable. Also, the responsibilities outlined in Executive Order 11988 for evaluating potential effects of actions on flood plains were considered in this study; however, there are no practical alternatives to the Brookley area in the upper harbor if significant additional port development areas are to be provided. Consideration of the area adjacent to Brookley Industrial Complex for fill and development is consistent with plans that are supported by the city of Mobile and the Alabama State Docks Department. The area would be adjacent to deeper channels and could be easily connected with existing highway, rail, and intra-harbor cargo transfer facilities. Physically, the area is characterized by submerged and emergent dredged material deposition mounds, borrow are pulled into the area as the result of the shadowing of river flow by McDuffie Island and remains of the Arlington Pier. Although recent recovery trends have been noted in the area, it continues to have persistently low dissolved oxygen in the borrow depression, and marine life and water quality have been degraded from years of pollution from the Garrows Bend area. During initial dike construction for the Brookley fill resulting turbidities would be unavoidable. However, upon closure of the peripheral dike, all disposal within the area would be controlled and the material permanently contained. Model tests to date do not indicate any significant effects of the Brookley fill on circulation in Mobile Bay although more detailed tests would be conducted before any actual construction would be undertaken.

A southwesterly slant of the southern side of the fill could minimize entrapping effects such as presently exist as the result of McDuffie Island. The Brookley site would be the most beneficial to port and economic development and would represent the least environmental loss when compared to other bay bottom areas within Mobile Bay. The recommended plan would also provide for an opening in the McDuffie Island causeway as a mitigative measure to further enhance water circulation and biological productivity in the Garrows Bend area.

Model tests of overall bay effects of the channel enlargement indicate a slight increase in the average salinity in the northeast quadrant of the bay and a slight reduction in the Bon Secour Bay area. It is unclear at this time whether the changes are the result of more or less freshwater in the respective areas. Further model tests and evaluations of these effects will be a part of any recommendations for enlargement of the Mobile Harbor Channel. In view of the extreme natural fluctuations of Mobile Bay between fresh and saline conditions, assessments of the small variations in the averages have been inconclusive as to whether net impacts may be beneficial or adverse.

Essentially all material from past dredging of navigation channels in Mobile Bay has been deposited in open waters adjacent to the ship channel. Physical buildups have occurred in the upper portion of the bay but little long-term effects are indicated in the lower bay. The effects of these operations on the chemistry of the bay have been the subject of much hypothesis and conjecture. However, little scientific data exist to support any firm conclusions. Regardless of the available data that indicates only minor impacts of estuarine open-water disposal of dredged material, many agencies and other interests advocate deep ocean or gulf disposal of dredged material. Gulf disposal is recommended for most of the new work and all future maintenance for Mobile Harbor, although we have limited data on potential gulf impacts at this time. The data limitations are largely due to the still-emerging criteria for evaluating ocean disposal impacts. However, all appropriate studies would be accomplished before any ocean disposal of new work is initiated. In the interim much of the needed studies and evaluations may be accomplished by our dredged material disposal study for Mississippi Sound and Adjacent Areas. The scope of that study will include an evaluation of the impacts of both ocean and estuarine open-water disposal with either remaining a future option depending upon more detailed study outcomes.

Modification of the US Highway 90 Causeway across Mobile Bay will require additional studies in order to identify this measure as the most cost effective and environmentally desirable method of mitigating the loss of bay bottom taken for the Brookley expansion area.

Overall, many long-term and complex investigations have been performed in connection with our studies for Mobile Harbor. This information indicates that modifications to the recommended plan can be made within the scope of work identified in this study to correct or mitigate environmental damage related to the proposed harbor improvements. However, due to the complexity of the affected resources, increasing knowledge of water resource behavior and changing policies and legislation regulating the planning process, additional studies will be required before some of the recommended harbor modifications can be identified in detail.

ENVIRONMENTAL IMPACT STATEMENT (SUMMARY)

The following is a general summary of the Draft Environmental Impact Statement. The complete document is attached as Appendix 1.

Description of Action. The recommended plan for improvement of Mobile Harbor consists of enlarging the existing channel to provide a depth of 57 feet and a width of 700 feet from the 57-foot depth contour in the Gulf of Mexico for a distance of about 7.4 miles to a point in Mobile Bay near the eastern end of Dauphin Island; enlarging the channel through Mobile Bay to a depth of 55 feet and width of 550 feet for a distance of about 27 miles between the inner end of the gulf entrance channel and a point about 3.6 miles south of the mouth of Mobile River; enlarging the channel into the harbor to provide a depth of 55 feet and a width of 650 feet for a distance of about 4.2 miles to a point 1 mile south of the Interstate Highway 10 Tunnel and providing an anchorage area 500 feet, in addition to the channel width, 55 feet deep and 4,000 feet long on the east side of the main channel and immediately south of a turning basin to be constructed to a 55-foot depth, a 1,500-foot width (including the channel) and 1,500 feet long just south of Little Sand Island. The project would provide for disposal of about 141.2 million cubic yards of new work material as well as all future maintenance material for a 50-year economic life. Approximately 63,400,000 cubic yards of new work material in the upper bay reach would be excavated by hydraulic pipeline dredge and pumped to a diked disposal area in the vicinity of the Brookley waterfront. Construction of the lower bay reach would involve removal of about 58,700,000 cubic yards of material by hydraulic dredge utilizing dump scows and tow boats to transport the dredged material to a gulf disposal area, the location of which to be

designated by the Environmental Protection Agency in accordance with the 11 January 1977 Ocean Dumping Criteria, developed pursuant to the Marine Protection, Research, and Sanctuaries Act of 1972, PL 92-534. Maintenance of the upper and lower bay channels would also be by hydraulic dredge and transported by dump scows offshore. New work, approximately 19,100,000 cubic yards, and maintenance material from the bar channel would be excavated by hopper dredge and disposed at a gulf site. The benefit-to-cost ratio for the project is 1.5 to 1.

Environmental Impacts. Evaluated accomplishments that would result from implementation of the recommended plan are direct transportation savings through increased use of larger, more economical vessels, and land enhancement from fast land created adjacent to the Brookley Industrial Complex. In addition, supplemental benefits creditable to improving the harbor channel would result from elimination of lost vessel time due to constrained traffic in the channels. Environmental impacts of the proposed project were evaluated in accordance with requirements of Section 404, PL 92-500, and other applicable laws and guidelines. Primary impacts would be associated with channel construction and subsequent maintenance dredging operations; construction and stabilization of the expansion area in the upper bay; and offshore disposal of dredged material. Secondary impacts would result from the enhanced economic development of the area.

Unavoidable adverse impacts associated with the project would arise from the dredging and disposal operations which would destroy some benthic populations, cause a minor release of pollutional constituents, increase turbidity, and result in a physical loss of some bay bottom habitat and recreational/fisheries areas. There are also other adverse impacts that can be avoided only if remedial measures can be established. These are associated with modifications to overall circulation and salinity patterns in the bay caused by channel construction and sites of historical interest, if any, located within the channel alignment and disposal areas. Secondary impacts of the project would include higher levels of noise, water, and air pollution related to increased economic development of the area.

Alternatives. Along with a "No-Action" Plan, alternatives include consideration of changes in the widths and depths of the existing channels and various methods of excavation and disposal of dredged material. Dredged material disposal options include: construct island and fill areas in upper and lower Mobile Bay; open-water disposal in the bay and/or gulf; upland disposal; recycle material off existing disposal sites; and shoreline nourishment to abate erosion.

CONCLUSIONS

After carefully considering all technical information and public views, and with particular reference to the economic, environmental, and social well-being considerations, the plan recommended herein is considered to be in the best public interest. The identified needs and studies to date are sufficient to proceed with the selected plan in this report as a framework for future development of Mobile Harbor, contingent upon the additional studies identified. Updated benefit and cost data for the recommended plan is provided as an attachment to the Summary Report.

RECOMMENDATIONS

It is recommended that the existing Federal navigation project for Mobile Harbor, Alabama, be modified, subject to such modifications as the Chief of Engineers may deem appropriate, to provide for:

- Deepening and widening the gulf entrance channel to 57 by 700 feet,
- Deepening and widening the main ship channel to 55 by 550 feet in Mobile Bay, except for the upper 3.6 miles which require a width of 650 feet,
- Deepening the Mobile River channel to 55 feet to a point about 1 mile below the Interstate 10 highway tunnels, and
- Constructing turning and anchorage basins near the upper end of the main ship channel.

The recommended plan further provides for related improvements including justified mitigation measures in accordance with the selected plan in this report. The work may be accomplished in separable increments as determined feasible by the Chief of Engineers, in that accordingly, written agreements required by Section 221, PL 91-611, may be accepted for preceding independently with each such increment.

This recommendation is made with the provision that, prior to the commencement of construction, local interests will, in addition to the general requirements of law for these types of projects, agree to comply with the following requirements:

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction and maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of dredged material, and including necessary retaining dikes, wiers, bulkheads, and embankments therefor, or the costs of such retaining works;

b. Hold and save the United States free from damages due to the construction and maintenance of the project, not including damages due to the fault or negligence of the United States or its contractors;

c. Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities, and other structures and improvements necessary for project purposes.

d. Provide and maintain without cost to the United States vessel berthing areas and local access channels;

e. Prohibit erection of any structure within 175 feet of the project channel as authorized;

f. Provide and maintain without cost to the United States adequate public terminal and transfer facilities open to all on equal terms;

g. Provide a cash contribution based on the final first cost allocated to special local benefits deriving from land enhancement due to landfill; and

h. Fulfill the requirements of non-Federal cooperation as specified in the terms of conditions of the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 (PL 91-646) approved 2 January 1971.

Application of the President's June 1978 water policy to the Mobile Harbor project requires a contribution from the State of Alabama of an estimated $16,904,000 in cash (5 percent of $338,072,000 total estimated project first costs assigned to nonvendible project purposes based on August 1980 price levels). Other items of local cooperation would not be affected by this additional requirement.

Robert H. Ryan
ROBERT H. RYAN
Colonel, EN
District Engineer

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[First endorsement]

SUBJECT: Mobile Harbor, Alabama - 55480

DA, South Atlantic Divison, Corps of Engineers, 510 Title Building, 30 Pryor Street, S.W., Atlanta, Georgia 30303 4 November 1980

TO: Board of Engineers for Rivers and Harbors, Kingman Building, Fort Belvoir, Virginia 22060

I concur in the recommendations of the District Engineer.

Pleasant H. West
PLEASANT H. WEST
Colonel, Corps of Engineers
Acting Division Engineer

ATTACHMENT 1

Benefit and Cost Update
(August 1980)

MOBILE HARBOR, ALABAMA

BENEFIT AND COST UPDATE

The navigation benefits and project costs shown in the summary and technical appendix are based on October 1978 data. This attachment updates the benefits and costs to August 1980.

BENEFITS

The procedure for updating these benefits is based on an unadopted uniform method of updating benefits for deep draft navigation projects, as published in EC 1105-2-80 dated 16 May 1977. The economic indicators are: 40% for skilled labor and 30% for construction, as published in Engineering News-Record, and 30% for transportation, as published in Survey of Current Business. A further adjustment indicator was applied to reflect changes in the price of fuel. Based on dry bulk carriers data and costs submitted by OCE in 1979, fuel costs represent about 24% of the vessels' total annual operating costs. The remainder or 76% was proportioned to the other three indicators based on their relative position. The results of these adjustments are as follows:

Skilled labor		40%		30%
Construction	76%	30%	or	23%
Transportation		30%		23%
Fuel costs	24%			24%

The 1 October 1978 benefits as shown in the report are based on vessel costs effective 1 January 1977. Since vessel cost "with" and "without" project are based on the same vessels, but being more fully

loaded, the benefits are directly associated with the relative costs; consequently, the benefits only are updated. The following procedure was used to determine the increase factor:

Update Factors

Economic	1 Jan 77	25 Aug 80	Increase
Indicator	**Index**	**Index**	**Factor**
Skilled labor	2200.00	2828.8	1.2858
Transportation	161.3	238.2	1.4773
Construction	2494.3	3319.6	1.3273
Fuel price	.336 *	.872	2.5952

* Actual price of fuel

Adjustment of Factors

Skilled labor	1.2858 X 30 =	.3857
Transportation	1.4773 X 23 =	.3398
Construction	1.3273 X 23 =	.3053
Fuel price	2.5952 X 24 =	.6228
	Adjusted increase factor	1.6536

Fuel prices subsequent to January 1977 are based on a regression analysis on past trends of fuel prices (January 1977 through August 1978) for determining future prices. The August 1980 navigation benefits are based on the previously reported benefits (August 1978) revised to reflect 7 3/8% percent interest rate and updated with an adjusted increase factor of 1.65.

Navigation Benefits

Project	Transportation benefits		
Depth (ft)	Updated benefits (1978)	Increase factor	Updated benefits August 1980
45	$11,021,000	1.65	$18,185,000
50	20,577,000	1.65	33,952,000
55	30,340,000	1.65	50,061,000
60	35,174,000	1.65	58,037,000

COSTS

The first costs given herein are estimated for the selected plan and the Gulf Disposal Plan No. 1 as described in the summary report and in Section E of Appendix 5. Costs are based upon August 1980 dollar values. The advance engineering and design costs, maintenance during construction and interest during construction reflect compressing the post-authorization schedule on plate F-1 in Section F of Appendix 5. A schedule was coordinated with South Atlantic Division staff that shows Phase I and Phase II AE&D studies complete in four years, construction beginning one year following the approval of Phase II GDM and construction taking four and one-half years.

The contributions required by local interests are based on 100% of the cost allocated for land enhancement of the Brookley expansion area, a share of the mitigation costs based on the percent of local project costs to the total cost, and 5% of total estimated project first costs.

Annual charges are based on August 1980 dollars, an interest rate of 7 3/8% and an economic period of analysis of 50 years (1995-2044). A detail development of the costs is presented in the following tables:

ESTIMATE OF FIRST COST 1/
SELECTED PLAN
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (MODIFIED)
55-FOOT CHANNEL
(August 1980 Price Level)

FEDERAL FIRST COST	
Dredging	
Upper Bay Channel	
63,400,000 cu.yds. @ $1.21/cu.yd.	$ 76,714,000
Lower Bay Channel	
58,653,704 cu.yds. @ $1.94 /cu.yd.	113,788,000
Entrance Channel	
19,018,594 cu.yds. @ $3.41/cu.yd.	64,853,000
Mooring Dolphins	
16 @ $63,263 ea	1,012,000
	$256,367,000
Contingencies @ 20%	51,273,000
Engineering & Design @ 3%	9,229,000
Supervision & Administration @ 3%	9,506,000
	$326,375,000
Contribution by Local Interests	-16,318,000
	$310,057,000
Mitigation	2,234,000
	$312,291,000
Navigation Aids (U.S.C.G.)	107,000
TOTAL FEDERAL FIRST COST	$312,398,000

NON-FEDERAL FIRST COST

Dredging Berthing Areas	
1,890,000 cu.yds. @ $1.21/cu.yd.	**$2,287,000**
Dike Construction (over & above Corps of Engineers dredging cost)	
0.5 percent of upper bay dredging	**400,000**
Dike Dressing & Shaping	**40,000**
Waste Weirs	**39,000**
Revetment (20,900 feet @ $236/ft.)	**4,932,000**
	$7,698,000
Contingencies @ 20%	**1,540,000**
Contribution by Local Interests	**16,318,000**
Mitigation	**118,000**
TOTAL NON-FEDERAL FIRST COST	**$25,674,000**
TOTAL ESTIMATED FIRST COST	**$338,072,000**

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[1] **First Cost Based on Existing Policy**

ANNUAL CHARGES
SELECTED PLAN
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (MODIFIED)
55-FOOT CHANNEL
AUGUST 1980 PRICE LEVEL
(EXISTING POLICY)

FEDERAL ANNUAL CHARGES	
Interest and Amortization	
$364,232,000 7 3/8% for 50 years	$27,652,000
($312,379,000 First Cost)	
($51,853,000 Interest during Construction)	
Maintenance Dredging	
Increase due to larger channel	
Upper Bay (79,322 cu.yds. @ $2.40/cu.yd.)	190,000
Lower Bay (150,122 cu.yds.@ $1.80/cu.yd.)	270,000
Entrance (474,516 cu.yds. @ $2.94/cu.yd.)	1,395,000
Maintenance During Construction	
$4,175,000 X 0.075914	317,000
Maintenance of Mooring Dolphins	34,000
Maintenance of Navigation Aids(U.S.C.G.)	5,000
TOTAL FEDERAL ANNUAL CHARGES	$29,863,000
NON-FEDERAL ANNUAL CHARGES	
Interest and Amortization	
$29,481,000 7 3/8% for 50 years	$ 2,238,000
($25,674,000 First Cost)	
($3,807,000 Interest during Construction)	
Maintenance of Dikes	
20,900 feet X $2.78/ft.	58,000
Maintenance of Berthing Areas	
189,000 cu.yds. @ $2.40 cu.yd.	454,000
TOTAL NON-FEDERAL ANNUAL CHARGES	$ 2,750,000
TOTAL ANNUAL CHARGES	$32,613,000

COST SHARING
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (MODIFIED)
55-FOOT CHANNEL
AUGUST 1980 PRICE LEVEL

SHARE	ESTIMATED FIRST COST	ANNUAL CHARGES
TOTAL	$338,072,000	$32,613,000
FEDERAL:		
President's Proposed Policy 1/	295,494,000	28,579,000
Existing Policy	312,398,000	29,863,000
NON-FEDERAL:		
President's Proposed Policy 1/	42,578,000	4,033,000
Existing Policy	25,674,000	2,750,000

1/ President's Proposed Policy Based on a 5% state contribution of total project first cost ($338,072,000 X 0.05 = $16,904,000)

BENEFIT/COST RATIO
BROOKLEY EXPANSION AREA AND GULF DISPOSAL PLAN NO. 1 (MODIFIED)
55-FOOT CHANNEL
AUGUST 1980 PRICE LEVEL

Navigation Benefits	$50,061,000
Land Enhancement Benefits	2,742,000
Total Annual Benefits	$52,803,000
Annual Charges	$32,613,000
BCR	1.6

ESTIMATE OF FIRST COST [1]
GULF DISPOSAL PLAN NO. 1
55-FOOT CHANNEL
AUGUST 1980 PRICE LEVEL

FEDERAL FIRST COST	
Dredging	
Upper Bay Reach (above Theodore) 63,400,000 cu.yds. @ $2.77/cu.yd.	$175,618,000
Lower Bay Reach 58,654,000 cu.yds. @ $1.94/cu.yd.	113,789,000
Entrance Channel 19,019,000 cu.yds. @ $3.41/cu.yd.	64,855,000
Mooring Dolphins (16 @ $63,263 ea.)	996,000
SUBTOTAL	$355,258,000
Contingencies @ 20%	71,052,000
Engineering & Design @ 3%	12,789,000
Supervision & Administration @ 3%	13,173,000
TOTAL CONSTRUCTION	$452,272,000
Aids to Navigation (U.S.C.G.)	107,000
TOTAL FEDERAL FIRST COST	$452,379,000
NON-FEDERAL FIRST COST	
Dredging	
Berthing Areas (1,890,000 cu.yds. @ $2.77/cu.yd.)	$ 5,235,000
Contingencies @ 20%	1,047,000
TOTAL NON-FEDERAL FIRST COST	$ 6,282,000
TOTAL ESTIMATED FIRST COST	$458,661,000

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[1] First Cost Based on Existing Policy

ANNUAL CHARGES
GULF DISPOSAL PLAN NO. 1
55-FOOT CHANNEL
AUGUST 1980 PRICE LEVEL
(EXISTING POLICY)

FEDERAL ANNUAL CHARGES	
Interest and Amortization	
7 3/8% for 50 years	
\$527,428,000 [1/] X 0.075914	\$40,039,000
Maintenance Dredging	
Increase due to larger channel	
Upper Bay (79,322 cu.yds. @ \$2.40/cu.yd.)	190,000
Lower Bay (150,122 cu.yds. @ \$1.80/cu.yd.)	270,000
Entrance (474,516 cu.yds. @ \$2.94/cu.yd.)	1,395,000
Maintenance During Construction	
\$4,175,000 X 0.075914	317,000
Maintenance of Mooring Dolphins	34,000
Maintenance of Navigation Aids (U.S.C.G.)	5,000
TOTAL FEDERAL ANNUAL CHARGES	\$42,250,000
NON-FEDERAL ANNUAL CHARGES	
Interest and Amortization	
7 3/8% for 50 years	
\$6,282,000 X 0.075914	\$ 477,000
Maintenance of Berthing Areas	
189,000 cu.yds. @ \$2.40/cu.yd.	454,000
TOTAL NON-FEDERAL ANNUAL CHARGES	\$ 931,000
TOTAL ANNUAL CHARGES	\$43,181,000

[1/] Includes interest during construction (4.5 years @ 7 3/8% = \$75,049,000

COST SHARING
GULF DISPOSAL PLAN NO. 1
55-FOOT CHANNEL
AUGUST 1980 PRICE LEVEL

SHARE	ESTIMATED FIRST COST	ANNUAL CHARGES
TOTAL	$458,661,000	$43,181,000
FEDERAL:		
President's Proposed Policy [1]	429,446,000	40,509,000
Existing Policy	452,379,000	42,250,000
NON-FEDERAL:		
President's Proposed Policy [1]	29,215,000	2,672,000
Existing Policy	6,282,000	931,000

[1] President's Proposed Policy Based on a 5% State contribution of total project first cost ($458,661,000 X 0.05 = $22,933,000)

BENEFIT/COST RATIO
GULF DISPOSAL PLAN NO. 1
55-FOOT CHANNEL
AUGUST 1980 PRICE LEVEL

Navigation Benefits	$50,061,000
Annual Charges	$43,181,000
BCR	1.2

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FINAL ENVIRONMENTAL IMPACT STATEMENT

APPENDIX 1

FINAL

ENVIRONMENTAL IMPACT STATEMENT

MOBILE HARBOR

CHANNEL IMPROVEMENTS
MOBILE COUNTY, ALABAMA

Prepared by
US Army Engineer District, Mobile
Mobile, Alabama
October 1980

SUMMARY

Mobile Harbor Channel Improvements
Mobile County, Alabama

[ ] Draft [X] Final Environmental Statement

Responsible Office: U. S. Army Engineer District, Mobile
P. O. Box 2288
Mobile, Alabama 36628
Telephone: (205) 690-2511

1. Name of Action: ( ) Administrative (X) Legislative

2. Description of Action: The proposed plan for improvement of Mobile Harbor consists of enlarging the existing channel to provide a depth of 57 feet and a width of 700 feet from the 57-foot depth contour in the Gulf of Mexico for a distance of about 7.4 miles to a point in Mobile Bay near the eastern end of Dauphin Island; enlarging the channel through Mobile Bay to a depth of 55 feet and width of 550 feet for a distance of about 27 miles between the inner end of the gulf entrance channel and a point about 3.6 miles south of the mouth of Mobile River; enlarging the channel into the harbor to provide a depth of 55 feet and a width of 650 feet for a distance of about 4.2 miles to a point 1 mile south of the Interstate Highway 10 tunnel and providing an anchorage area 500 feet, in addition to the channel width, 55 feet deep and 4,000 feet long on the east side of the main channel and immediately south of a turning basin to be constructed to a 55-foot depth, a 1,500-foot width (including the channel) and 1,500 feet long just south of Little Sand Island. The project would provide for disposal of about 141.2 million cubic yards of new work material as well as all future maintenance material for a 50 year economic life. Approximately 63,400,000 cubic yards of new work material in the upper bay reach would be excavated by hydraulic pipeline dredge and pumped to a diked disposal area in the vicinity of the Brookley waterfront. Construction of the lower bay reach would involve removal of about 58,700,000 cubic yards of material by hydraulic dredge utilizing dump scows and tow boats to transport the dredged material to a gulf disposal area, the location of which to be determined by the Environmental Protection Agency. Maintenance of the upper and lower bay channels would also be by hydraulic dredge and transported by dump scows offshore. New work, approximately 19,100,000 cubic yards, and maintenance material from the bar channel would be excavated by hopper dredge and disposed at a gulf site. The benefit to cost ratio for the project is 1.6 to 1.

3.a. Environmental Impacts: Evaluated accomplishments that would result from implementation of the proposed project are direct transportation savings through increased use of larger, more economical vessels, and land enhancement from fast land created adjacent to the Brookley Industrial Complex. In addition, supplemental benefits creditable to improving the harbor channel would result from elimination of lost vessel time due to constrained traffic in the channels. Environmental impacts of the proposed project were evaluated in accordance with requirements of Section 404, PL 92-500, and other applicable laws and guidelines. Primary impacts would be associated with channel construction and subsequent maintenance dredging operations; construction and stabilization of the expansion area in the upper bay; and offshore disposal of dredged material. Secondary impacts would result from the enhanced economic development of the area.

b. Unavoidable adverse impacts associated with the project would arise from the dredging and disposal operations which would destroy some benthic populations, cause a minor release of pollutional constituents, increase turbidity, and result in a physical loss of some bay bottom habitat and recreational/fisheries areas. There are also other adverse impacts that can be avoided only if remedial measures can be established. These are associated with modifications to overall circulation and salinity patterns in the bay caused by channel construction, and sites of historical interest, if any, located within the channel alignment and disposal areas. Secondary impacts of the project would include higher levels of noise, water, and air pollution related to increased economic development of the area.

4. Alternatives: Along with a no action plan, alternatives include consideration of changes in the widths and depths of the existing channels and various methods of excavation and disposal of dredged material. Dredged material disposal options include: construct island and fill areas in upper and lower Mobile Bay; open water disposal in the bay and/or gulf; upland disposal; recycle material off existing disposal sites; and shoreline nourishment to abate erosion. Environmental improvement measures to be considered further in connection with navigation improvements include: restore tidal action in Chacaloochee and Polecat Bays; establish oyster beds in Bon Secour Bay; improve water circulation in Mobile Bay by creating openings in ridges paralleling the channel from Dog River to Mobile River; fill depressions which exist in Mobile Bay; establish a recycle plan to remove material from existing Blakely and Pinto Island disposal areas; and evaluate the feasibility of establishing wetland areas.

5. Comments Received:

US Environmental Protection Agency
US Department of the Interior
US Department of Commerce, National Marine Fisheries Service
US Department of Commerce, Maritime Administration

US Department of Transportation, Federal Aviation Administration
US Department of Transportation, United States Coast Guard
US Department of Agriculture, Soil Conservation Service
US Department of Health, Education and Welfare
Alabama Water Improvement Commission
Alabama Office of State Planning and Federal Programs
South Alabama Regional Planning Commission
Geological Survey of Alabama
Alabama Historical Commission
Mobile County Health Department
Industrial Development Board of the City of Mobile
Mobile United
League of Women Voters

6. Draft Statement to EPA 2 July 1979 ____.

Final Statement to EPA____________.

F I N A L
ENVIRONMENTAL IMPACT STATEMENT

MOBILE HARBOR
CHANNEL IMPROVEMENTS
MOBILE COUNTY, ALABAMA

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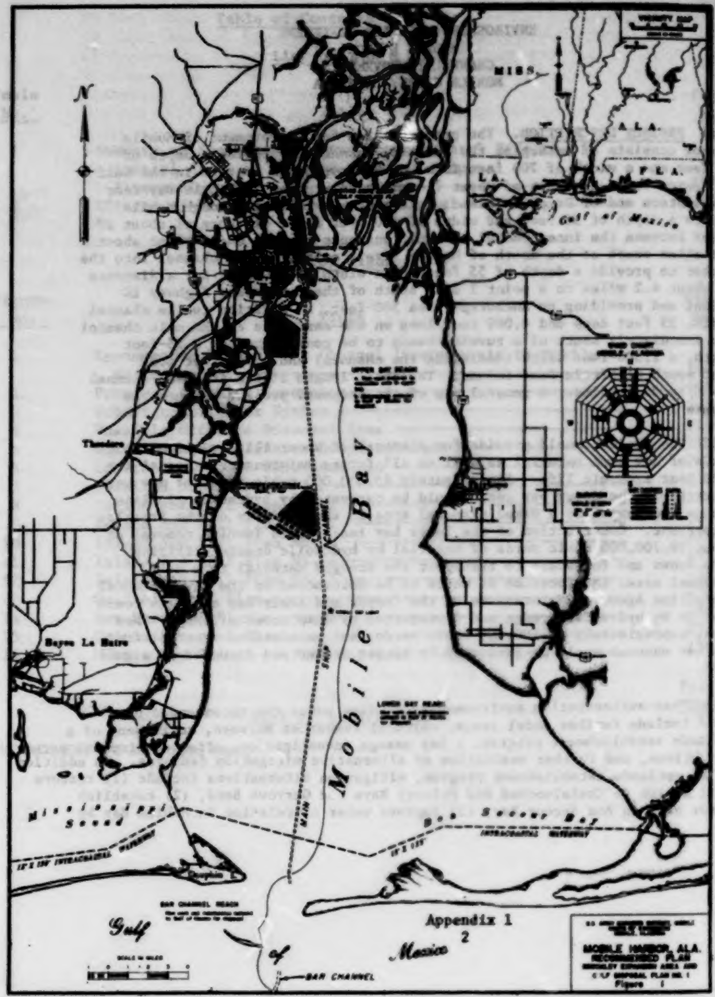
FINAL
ENVIRONMENTAL IMPACT STATEMENT
MOBILE HARBOR
CHANNEL IMPROVEMENTS
MOBILE COUNTY, ALABAMA

1.01 PROJECT DESCRIPTION. The proposed plan for improvement of Mobile Harbor consists of enlarging the existing channel to provide a depth of 57 feet and a width of 700 feet from the 57-foot depth contour in the Gulf of Mexico for a distance of about 7.4 miles to a point in Mobile Bay near the eastern end of Dauphin Island; enlarging the channel through Mobile Bay to a depth of 55 feet and width of 550 feet for a distance of about 27 miles between the inner end of the gulf entrance channel and a point about 3.6 miles south of the mouth of Mobile River; enlarging the channel into the harbor to provide a depth of 55 feet and a width of 650 feet for a distance of about 4.2 miles to a point 1 mile south of the Interstate Highway 10 tunnel and providing an anchorage area 500 feet, in addition to the channel width, 55 feet deep and 4,000 feet long on the east side of the main channel and immediately south of a turning basin to be constructed to a 55-foot depth, a 1,500-foot width (including the channel) and 1,500 feet long just south of Little Sand Island. The total length of the improved channel would be 38.6 miles. A general map of the proposed project is shown as Figure 1.

1.02 The project would provide for disposal of about 141.2 million cubic yards of new work material as well as all future maintenance material for a 50 year economic life. Approximately 63,400,000 cubic yards of new work material in the upper bay reach would be excavated by hydraulic pipeline dredge and pumped to a diked disposal area in the vicinity of the Brookley waterfront. Construction of the lower bay reach would involve removal of about 58,700,000 cubic yards of material by hydraulic dredge utilizing dump scows and tow boats to transport the dredged material to a gulf disposal area, the location of which to be determined by the Environmental Protection Agency. Maintenance of the upper and lower bay channels would also be by hydraulic dredge and transported by dump scows offshore. New work, approximately 19,100,000 cubic yards, and maintenance material from the bar channel would be excavated by hopper dredge and disposed at a gulf site.

1.03 Post-authorization environmental studies under the recommended plan would include further model tests, cultural resources surveys, refinement of a wetlands establishment program, a bay useage investigation, offshore disposal site evaluations, and further evaluation of alternative mitigation features. In addition to the wetlands establishment program, mitigation alternatives include (1) restore tidal action in Chacaloochee and Polecat Bays and Garrows Bend, (2) establish oyster beds in Bon Secour Bay, (3) improve water circulation in Mobile Bay by


N
MISS.
ALA.
FLA.
LA.
Gulf of Mexico
Theodore
Bayou La Batre
Mobile Bay
MAIN SHIP CHANNEL
UPPER BAY REACH
LOWER BAY REACH
BAR CHANNEL REACH
Mississippi Sound
Bon Secour Bay
INTRACOASTAL WATERWAY
Dauphin Is.
Gulf of Mexico
BAR CHANNEL
SCALE IN MILES
MOBILE HARBOR, ALA.
RECOMMENDED PLAN
BROOKLEY EXPANSION AREA AND
GULF DISPOSAL PLAN NO. 1
Figure 1

Appendix 1
2

creating openings in ridges paralleling the channel from Dog River to Mobile River, (4) fill depressions which exist in Mobile Bay, and (5) establish a recycle plan to remove material from existing Blakeley and Pinto Island disposal areas. As discussed in section 6, items listed above as number 1 could be implemented without further model studies. Further coordination with Federal, State, and local agencies, citizens groups and interested parties would be included with the post-authorization studies.

1.04 The proposed plan represents a comprehensive guide for development of Mobile Harbor. In order to maintain efficiency and safety, separable features could be implemented early at the existing authorized depth of 40 feet. These include channel widening in the upper bay, a turning and anchorage area at the head of the bay, a passing lane in the central area of the bay and mitigating features to improve water circulation in Chacaloochee Bay and Garrows Bend. Incremental construction of the project would be analyzed further during post-authorization studies.

1.05 The survey studies for Mobile Harbor have been developed in compliance with a resolution adopted 24 June 1965 by the Public Works Committee, United States House of Representatives directing that studies be made to determine whether the existing project should be modified. Due to a request by local interest early studies addressed evaluation and preparation of an interim survey report on the now authorized Theodore Ship Channel project. The proposed project was formulated consistent with the Water Resource Council Principles and Standards (P&S).

1.06 The existing project for Mobile Harbor was authorized by Section 104 of the River and Harbor Act of 3 September 1954 (House Document 74, 83rd Cong., 1st Session), and previous acts. Authorized dimensions provide a 42-by 600-foot channel about 1.5 miles long across Mobile Bar; a 40-by 400-foot channel in Mobile Bay to the mouth of Mobile River; a 40-foot channel in Mobile River to the Cochrane Bridge, varying in width from 500 to 775 feet; and several branch channels turning basins and anchorages all of which are described in detail in the environmental impact statement for operation and maintenance of the project.

1.07 Maintenance of the 41.7 miles of navigation channels within the existing Harbor Project system requires several different operational methods, depending upon the location of the specific channel segment. The Bar Channel is maintained with a hopper dredge, with deposition of the dredged material in the open gulf in an approximately 4.4 square mile disposal area located just south of Dauphin Island. The disposal area has interim approval by the Environmental Protection Agency (EPA) as an ocean dumping site. The Bay Channel is maintained with a hydraulic pipeline dredge and the dredged material is deposited in open water on both sides of the channel. Fifteen disposal sites paralleling the channel occupy approximately 20,000 acres of bay bottom and are almost continuous along both sides of the channel. The Mobile River segment of the harbor project is maintained using a hydraulic pipeline dredge with disposal of the dredged material in diked-land areas known as Blakely Island and Pinto Island.

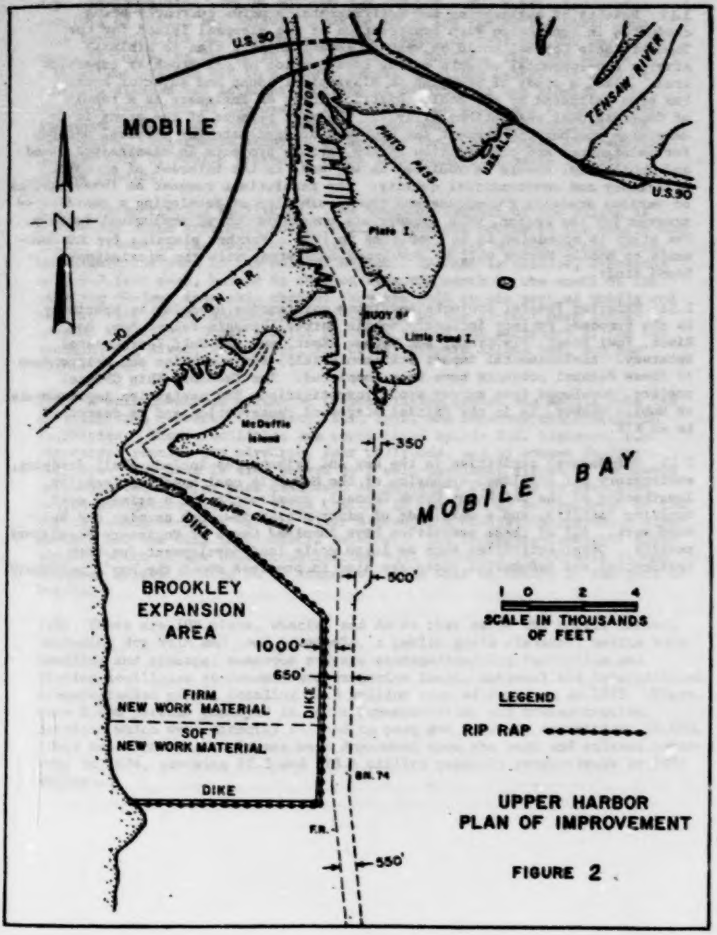
1.08 Evaluated accomplishments that would result from implementation of the proposed project are direct transportation savings through increased use of larger, more economical vessels, and land enhancement from fast land created adjacent to the Brookley Industrial Complex. In addition supplemental benefits creditable to improving the harbor channel would result from elimination of lost vessel time due to constrained traffic in the channels. As shown on Attachment 1 the initial Federal cost of the proposed project is $295,494,000. Non-Federal initial cost is $42,978,000. The average annual benefits to be derived from the project are estimated at $52,803,000, while the total average annual charges are estimated at $32,613,000. The benefit to cost ratio is 1.6 to 1.0.

1.09 Construction of the proposed project could be accomplished in about seven years, utilizing one 30 inch hydraulic dredge for the upper bay, one modified 27 inch hydraulic dredge in the lower bay reach, and for about three years, one hopper dredge for the entrance channel. The 27 inch pipeline dredge would be modified by lowering the pump on the dredge ladder near the cutterhead to obtain greater densities in the dredge effluent and better economies from the barging operation. Also the dredge would be modified to discharge into dump scows at a production rate of 2,300 cubic yards per hour in situ. It is estimated a fleet of 8 tow boats and 16 dump scows would be required to transport the new work dredged material from the lower bay channel to a gulf disposal site without delaying dredging operations.

1.10 The completed channels would have side slopes of one vertical on five horizontal. Initial dredging would provide for an allowance of two feet overdepth required for advance maintenance plus two feet of allowable overdepth to compensate for inaccuracies in the dredging process. Most of the material to be excavated is composed of gray clay of high plasticity (fat clay) with occasional lenses of gray sandy clays and silty sands. Sand can be found in the upper third of the bay to a point about 6.5 miles south of the mouth of Mobile River. It is expected that material dredged from the Bar Channel would also be sandy.

1.11 As show on Figure 2 the sandy new work material from the upper third of the bay would be used to construct the dikes and fill approximately 61 percent of the Brookley expansion area. This would provide 1,047 acres of fast land to an elevation approximately 17.5 feet above mean low water. The remainder of the fill area would accommodate approximately 24 million cubic yards of new work material (clay) from the next 6 miles of channel down to the intersection of the Theodore channel. Further details on the design of the disposal areas are contained in Section E, of the Technical Report (Appendix 5).

1.12 After a period of consolidation and stabilization the dikes would be shaped up and provided with an appropriate covering to protect against erosive wave action. Those areas exposed to high energy waves would be armored with riprap. The dike slopes above mean high water and the wave wash area would be protected with grass. Wetlands would be established on the southern end of the disposal area to mitigate the loss of about 70 acres of marsh presently growing on the Brookley shoreline.


MOBILE
N
U.S. 90
MOBILE RIVER
PINTO PASS
TENSAW RIVER
USS ALA.
U.S. 90
Pinto I.
L.&N. R.R.
I-10
BUOY 8
Little Sand I.
McDuffie Island
350'
MOBILE BAY
Arlington Channel
DIKE
500'
1 0 2 4
SCALE IN THOUSANDS OF FEET
BROOKLEY EXPANSION AREA
1000'
650'
FIRM NEW WORK MATERIAL
SOFT NEW WORK MATERIAL
DIKE
DIKE
LEGEND
RIP RAP
BN. 74
F.R.
550'

UPPER HARBOR
PLAN OF IMPROVEMENT

FIGURE 2

1.13 Results of engineering and environmental studies currently being conducted in connection with construction of the disposal island for the Theodore Ship Channel would be used in establishing a plan to minimize adverse environmental effects during construction of the Brookley expansion area. Also, a study of dredging in Mississippi Sound and adjacent areas has been initiated by the Mobile District Corps of Engineers as a result of Congressional resolutions of 1977. The main purpose of the study is to determine whether the present and proposed dredged material disposal methods for maintenance and construction of the various projects in Mississippi Sound and Mobile Bay, should be modified in any way, in the interest of economic efficiency and environmental quality. The resolutions request an investigation of various dredging techniques and the possibility of developing a coordinated program for the region, with appropriate consideration of ecological factors. The study is scheduled to be completed in 1982. Further planning for improvements to Mobile Harbor will be developed consistent with the Mississippi Sound study.

1.14 Existing Federal projects involving maintenance dredging in proximity to the proposed project include: Mobile Harbor, Dauphin Island Bay, Dog River, Fowl River, Fly Creek, Bon Secour River, and the Gulf Intracoastal Waterway. Environmental impact statements (EIS) for operation and maintenance of these Federal projects have been completed. The Theodore Ship Channel project, developed from survey scope investigations for navigation improvements to Mobile Harbor, is in the initial stages of construction and is described in an EIS.

1.15 Non-Federal activities in the bay and tributaries include shell dredging, exploratory oil drilling, expansion of the McDuffie coal handling facility, lengthening of the Chickasaw Creek Channel, construction of a private coal handling facility, and a multitude of minor activities such as pier and bulkhead work. All of these activities have involved Corps of Engineers Regulatory permits. Other activities such as large scale land development for both residential and industrial sites are also in progress about the bay's periphery.

2.01 ENVIRONMENTAL SETTING WITHOUT THE PROJECT. The Mobile Bay region consists of Mobile and Baldwin Counties which are the only Alabama counties bordering the Gulf of Mexico. This region of over 400,000 people is rural in character except in the vicinity of Mobile. The city serves as a major wholesaling and to a lesser extent retailing center for much of southern Alabama and adjacent sections of Mississippi and Florida. The abundant resources of the nearby forest has made paper and allied lumber and wood products two of the most important manufacturing industries in the region. Waterborne shipping is another important aspect of commerce and the port of Mobile presently ranks 12th among U.S. ports in total volume handled.

2.02 Transportation Facilities. The dominant feature of the region is Mobile Bay which stretches about 30 miles from the mouths of the Mobile and Tensaw Rivers in the north of Pelican Point and Fort Morgan to the south, which mark the pass to the Gulf of Mexico. The bay is shallow, averaging only 9.7 feet deep, but it is crossed from the north to the south by the existing 40-foot deep ship channel from the gulf to the port of Mobile and east to west in the southern part of the bay by the 12-foot deep Intracoastal Waterway. Other smaller channels around the periphery of the bay include; Dog River, Fowl River, Fly Creek, Dauphin Island Bay, and Bon Secour River.

2.03 A well-developed system of transportation serves the Mobile area via an integrated network of highway, air, rail, and waterway transportation facilities. These facilities are constituted by six U.S. highways, two Interstate routes, two airports, four railroads, and 55 common freight carriers. The area is also served by a well-developed system of waterways including the coastal ones discussed in paragraph 2.02 and an extensive inland navigation system. Barge traffic in the area is accommodated by the Mobile-Tombigbee-Black Warrior River system, the Mobile-Alabama-Coosa River system, and the Gulf Intracoastal Waterway. The Tennessee-Tombigbee River project which is now under construction will connect a 16,000-mile inland waterway system located in 23 states with the Gulf of Mexico at the port of Mobile.

2.04 There are 108 piers, wharfs, and docks that serve the Mobile Harbor, including dry bulk and coal terminals, a public grain elevator, marine bulk handling and storage, numerous private storage/handling facilities and docking facilities to accommodate extensive local, national and international transportation needs, totaling 32.5 million tons of commerce in 1975. There were 2,800 persons employed in water transportation and transportation services which were directly related to port and waterway activities; 18,000 other manufacturing employees were dependent upon the port and related waterways in 1974, grossing 92.3 and 223.1 million payrolls respectively in 1976 dollars.

2.05 Population and Economy. Both Mobile and Baldwin Counties are experiencing rapid population and, consequently, urban growth. The 1976 estimated population of Mobile and Baldwin Counties was 416,600 persons. Although, Mobile County's population is approximately 5 times larger than Baldwin County, both counties are experiencing very rapid growth in population. Baldwin County's overall population increased 17% during the period 1970-76, while Mobile County's growth was 9.4%. The scheduled completion of Interstate 65 across the northern tier of the two counties, in combination with the already completed Interstate 10, has the potential of opening up large tracts of land for residential and industrial development within the area.

2.06 A survey by the South Alabama Regional Planning Commission in 1975 has indicated that a total of 117,600 people were employed in Mobile County and 17,700 in Baldwin County. The majority of these workers were employed in manufacturing and wholesale and retail trade components. Data from the Bureau of Economic Analysis up through 1975 shows a per capita income for Mobile County of $4,770, with Baldwin County running about $250 per annum lower. However, personal income in Baldwin County is rising at a more rapid rate than that of Mobile County. Largest increases have been in nonfarm personal income.

2.07 Cultural Resources. Mobile Bay's location and the area's mild climate have contributed greatly to the region's long and varied history. The bay has been the site of considerable navigation activity since the French arrival in 1699. Approximately 17 identified wrecks, ballast dumps or obstructions have been reported on Mobile Bay navigation charts from 1850 to 1976. Each of these are potential significant cultural resources. Additional data can be found in Section B of Appendix 5.

2.08 Bay Environment. The Mobile Bay estuarine system occupies 466 square miles including the Mobile River Delta, and it is the northern most estuary interfacing with the Gulf of Mexico (Crance, 1971). The third largest runoff volume in the continental United States (73,077 cfs annual average) enters Mobile Bay from the drainage area covering 43,560 square miles (Ryan, 1969; Chermolk, 1974). The range of recorded discharge has been from a maximum of 59,000 cubic feet per second (cfs) to a minimum of about 5,100 cfs (U.S. Army Corps of Engineers, 1975).

2.09 Mobile Bay is 30 miles in length (not including 12.6 miles of delta) and has an average width of 10.8 miles (Tanner, 1970). Within the overall estuarine zone, including the lower Mobile delta, are 6,244 acres of tidal marsh, 12,000 acres of fresh water lakes, 15,127 acres of bayous, rivers, and connecting bays and 249,343 acres in the bay itself. The general characteristics of the Mobile Bay system (circulation, current, salinity, density layers, etc.) reflect a situation which fluctuates seasonally while being greatly influence by variable volume of stream discharge, wind, and tidal conditions. Intermittently, perhaps daily, each of these variables will have a dominant influence on the hydrologic characteristics of the estuary.

2.10 The estuary has a tidal cycle which is diurnal and ranges from 1.5 feet at the head of the bay to 1.2 feet at the entrance. A weighted mean tidal height of the bay, 1.4 feet, and the surface area of the bay produce a tidal prism of 330,575-acre feet. The flushing time during relatively low river inflow conditions of 12,262 cfs is between 45 and 54 days (Austin, 1954).

2.11 Salinities in Mobile Bay change rapidly and over a wide range from 0 to 35 parts per thousand (o/oo). Major fluctuations in river discharge have an immediate effect upon salinity in all parts of the bay, but if short-lived, the effects are usually expressed only in the surface portions of the water column. As a result, conditions in the bay represent a wide range of mixed or stratified salinity conditions. Mixing between the surface and bottom water layers of the bay is not yet well studied. Factors that have altered natural circulation and salinity patterns within the bay include construction of land filled causeways and disposal of dredged material along the deep navigation channels in the upper third of the bay (Chermolk, 1974; U.S. Army Corps of Engineers, 1977).

2.12 Although Mobile Bay has been referred to as a graben by some experts, only one fault has been located. It therefore seems best to assume that it is the drowned mouth of a river valley. As such, it is rapidly filling with sediment. Ryan (1969) has calculated an annual average of 4.7 million tons of suspended sediment and an unknown quantity of bedload being transported annually into the estuary. He has also calculated a bay-wide sedimentation rate of approximately 22 inches during the past century from bathymetric changes in the bay. The bay-wide sedimentation rate of 22 inches per century translates into a quantity approaching 8,000,000 cubic yards, annually.

2.13 Several upland communities are found in the Mobile and Baldwin County area. The four dominant communities are the longleaf pine-oaks community, pine savannah community, bay forest community, and the large floodplain forest community of the Mobile River delta. These natural communities have been removed or altered considerably by man's activities in the area. Additional discussion can be found in paragraph 66 through 70 in Section B of the Survey Report.

2.14 Three general types of wetland communities are found in Mobile and Baldwin Counties. These are fresh water marshes, low salinity brackish marshes, and high salinity salt marshes. All of these marshes receive some tidal influence. The total acreages of wetland habitat within Alabama coastal zone varies widely depending on the author. Estimates have ranged as high as 34,614 acres by Crance in 1971 to 27,346 acres by Vittor and Stout in 1975. Although the latter work has numerous site specific errors, it has taken the most accurate determination of wetland acreage within the Alabama coastal zone. Much of this total acreage occurs in Mobile Bay and Mobile delta. For example, the bay and delta contain 43% of the 2,330 acres of salt marsh available within the coastal zone and 63.4% of the 11,231 acres of fresh-mixed marsh. The bulk of the bay salt marsh is associated with Deer, Fowl, and Dog Rivers. Brackish to saline species are normally associated with these areas. In the southern part of the bay, marshes are found at Little Point Clear on the north side of Fort Morgan Peninsula, the east end of Dauphin Island and Oyster Bay. Here a peripheral border of Spartina alterniflora grades into almost pure stands of Juncus roemerianus. Higher areas may be characterized by Spartina patens, Fimbristylis sp., Spartina cynosuroides, Phragmites communis, and Borrichia frutescens.

2.15 Phytoplankton, zooplankton, and benthic sea grass communities within the bay have been poorly investigated. Such findings as do exist are summarized in Section B of Appendix 5.

2.16 A total of 233 species of fish, representing 173 genera and 80 families, have been documented as occurring in the Mobile Bay area (Swingle, 1971). Eight species were found exclusively in the Mobile Ship Channel. Swingle indicated that the total number of species in the ship channel was higher than that in the adjacent areas in the bay since the high salinity water is conducive to the existence of many of the offshore gulf species.

2.17 Commercial Fisheries. Swingle (1976) stated that 100 species of fish and 11 species of invertebrates are classified as commercial species in Alabama. Most of the seafood is landed in Mobile County at Bayou la Batre which ranked as the 10th port in the nation in the value of seafood landed during the past few years. Commercial landings have increased from about 8 million pounds in 1961 to 30 million pounds in 1978 while showing an increase in dockside value to over $35 million annually. The primary commercial species include striped mullet, Atlantic croaker, kingfish, flounder, shrimp, and oysters. Additional discussion of the trends in the commercial fisheries in Mobile Bay can be found in Section B of Appendix 5.

2.18 Endangered and Threatened Species. The U.S. Department of Interior Fish and Wildlife Service includes in their list 6 mammals, 8 birds, and 4 reptiles that may occur in south Mobile County. However, only the following species have actually been reported from the project area within the last several decades. These are the Florida panther, finback whale, sperm whale, peragrine falcon, brown pelican, Bachmans warbler, ivorybill woodpecker, red cockaded woodpecker, American alligator, Atlantic Ridley sea turtle, hawksbill turtle, and leatherback turtle. Additional discussion can be found in Section B of Appendix 5.

2.19 Offshore Habitat. Data on the offshore benthic habitats are limited for Alabama waters. However, the samples that have been taken indicate that shoreward of the 10-fathom curve the benthic community is richer off Perdido Bay than it is off of Dauphin Island. This probably results from the sediment type which influences the abundance of the macroinfrauna. Smaller numbers of organisms were found in fine sand and clay substrates, but the individual size of each organism was larger. There is some evidence which suggests a high degree of annual variation within the offshore benthos.

2.20 Air Quality. Air pollution exists in Mobile County to the point of violating ambient air quality standards for photochemical oxidants and particulates. The entire county of Mobile is a non-attainment area for photochemical oxidants, that is ozone, and one sub-county area is non-attainment for total suspended particulates. The "downtown area" of Mobile violates the primary total suspended particulates standards. Photochemical oxidants are the product of a complex series of chemical reactions involving oxides of nitrogen, hydrocarbons, and sunlight. A significant portion of the photochemical oxidants with Mobile County are transported from other areas by wind. Within Mobile County, the main source of hydrocarbons is automobile exhaust and petroleum handling operations; the main source of oxides of nitrogen are automobile exhaust and other combustion sources. Additional coverage of air quality can be found in Section B of Appendix 5.

2.21 Water Quality. Since the bay is so large, individual pollution sources have little effect on the overall water quality of the bay, except in highly localized areas. Nonetheless, Mobile Bay has been subject to a slow but steady degradation over the years. In some areas, notably Garrow's Bend, there is evidence that this trend has been reversed as the municipalities and industries discharging into the bay have implemented proper treatment methodologies. The most wideranging and serious pollution impact has been the closing of oyster reefs for harvesting. Over 72,000 acres in the northern section of the bay have been permanently closed to the harvest of shellfish because of high coliform levels. Localized severe degradation of water quality has been documented in Chickasaw Creek, Three Mile Creek, and Dog River. An overall comprehensive planning document of the area's water quality has been recently completed by the South Alabama Regional Planning Commission (SARPC, 1978). Although this plan is still under review and has not been approved by the Environmental Protection Agency, specific recommendations have been made to achieve the greatest improvement of water quality of the least expenditure of funds. A total of $582 million would be required for planned implementation through the year 2000.

2.22 The waters of Mobile Bay are classified for a variety of uses by the Alabama Water Improvement Commission according to their existing water quality standards. In general, water quality improves with distance from the Mobile urban center. Most of the bay, including Bon Secour Bay is classified for swimming and fish and wildlife. About two-thirds of the bay is classified for shellfish harvesting in addition to swimming, fish and wildlife, while the northwestern corner of the bay is classified for fish and wildlife.

2.23 Recreation. The coastal area of Alabama offers a wide variety of recreational opportunities to residents and tourists. Because of the abundance of sunshine and water in coastal Alabama, recreation generally means outdoor activities such as fishing, boating, swimming, hiking, hunting, and camping. Native wildlife provides recreation for sport fishermen, waterfowl hunter, and the naturalist. Also, interesting historical sites, public parks, and excellent beaches are located along the shores. A major portion of the Mobile delta has been considered as a national wildlife refuge on two different occasions, 1964 and 1974. Although the refuge status has not been attained, the area has been included in the National Registry of Natural Landmarks. An additional study is presently underway by the National Park Service to determine the area's capability of being included within the Federal system of parks.

2.24 Recreation is also an important income producing industry within the state. For example, visitors to Gulf Shores in 1976 spent $5 million for food and lodging. This of course does not include receipts for gas, boat rentals, and other items used by vacationers. Data concerning other local expenditures are not available. However, travelers and tourists in Alabama spent more than $1 billion in 1977 and a significant portion of this amount was spent in coastal Alabama.

3.01 Relationship of the Proposed Project to Land Use Plans. The proposed project would provide additional land for port expansion in an area compatible with future projects of the "Regional Land Development and Policies Plan," 1977, developed by the South Alabama Regional Planning Commission with participation from other local land use affiliated groups. By letter of 25 September 1979 (Appendix 3) the South Alabama Regional Planning Commission indicates that the proposed plan is consistent with current area-wide plans, programs, and objectives.

3.02 As a result of Federal and State legislation, Alabama is developing a coastal zone management program under the direction of the Coastal Area Board. By letter of 12 May 1980 (Appendix 3), the Coastal Area Board concludes that the recommended plan and all alternatives are consistent with their management program, provided that biological resources are protected to the maximum extent practicable and appropriate mitigation measures are implemented.

4.01 THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT. Primary environmental impacts of the proposed project would be associated with: (1) channel construction and subsequent maintenance dredging operations, (2) construction and stabilization of the expansion area in the upper bay, and (3) offshore disposal of dredged material. Secondary impacts of the project would result from the enhanced economic development of the area.

4.02 Impacts of Channel Construction. About 700 acres of bay bottom and 520 acres of near shore bottom would be committed to the enlarged channel in addition to the areas in the existing channels. From a productivity viewpoint this impact is considered adverse since benthic productivity in the area committed to the enlarged channel is expected to diminish by approximately 80 percent. However, Swingle (1977) and others have indicated that the existing ship channel supports a more diverse fish fauna than the balance of the bay. Also, deep channels tend to provide a thermal refuge during the passage of cold fronts.

4.03 During construction and maintenance dredging, of the channels some turbidity would be created along the bottom in the immediate vicinity of the dredge cutterhead. Huston (1976), studying a cutterhead dredge operating in Corpus Christi Ship Channel (predominantly clay material), found that little of the turbidity created by the cutter went into the upper water column, especially from depths of 30 or 40 feet. Increased turbidity caused by the cutterhead would be considered to be minor and of short duration.

4.04 Noise levels would be elevated in the vicinity of the dredging operations. Air quality would be affected for a short period of time by the consumption of fuel and resulting engine exhausts of the dredging equipment. Neither would be considered significant increases over existing noise and air quality levels for the area.

4.05 A salinity wedge extends from the Gulf of Mexico along the bottom of the existing Mobile Ship Channel and up the Mobile River. The salinity concentrations vary seasonally according to river discharge with high concentrations (approximately 16 ppt) extending as far upstream as river mile 10 during low flow. According to model studies (discussed in section D of the Survey Report and paragraphs 4.42 - 4.47 of this EIS) the enlarged channel would allow more of the high salinity gulf waters to travel northward through the bay and thereby increase the salt wedge intrusion in the river. The upstream boundary of the wedge would remain somewhat unchanged, however, the lower 5 miles of the river would be subject to salinity intrusion for longer periods than presently experienced. The overall hydrological modifications to the bay related to the enlarged channel and disposal plan are discussed in more detail under the cumulative impacts subsection in following paragraphs.

4.06 *Impact of Disposal in Bay*. Under the Brookley Expansion plan, a total of approximately 1,710 acres of upper Mobile Bay bottoms would be covered with material dredged from the upper bay. Generally, the area is relatively shallow and ranges from four to six feet in depth. This area of the bay has been highly disturbed by man's activities and is characterized by submerged and emergent dredged material deposition mounds, borrow depressions up to 50 feet in depth, remains of the Arlington Pier, and debris that is pulled into the area as a result of the shadowing of river flow by McDuffie Island.

4.07 The area which would be filled constitutes approximately five percent of the bay's bottom that is less than six feet deep. These bottoms are used in sport-shrimping effort and the shoreline furnishes recreational opportunities, including softshell crabbing, castnetting for mullet, and floundering. However, no quantification of the annual use of the area is available. Swingle, Bland, and Tatum in a study on the 16-foot trawl fishery reported that the majority of the sport fishing effort in the early spring and late fall was directed toward upper Mobile Bay and that approximately 14.7 percent of the 5,727 fishermen owning trawls launch in the Dog River-Deer River area. Some of these fishermen undoubtedly travel up the bay to shrimp and utilize this area. The effect of removal of this area from production in the estuarine system is not known. However, Loesch (1965) and Heath (unpublished 1979) found more shrimp in the western side of the bay than the eastern side. They found small brown and white shrimp in greatest abundance in water depths of less than 4 feet and 2 feet, respectively. Heath's sampling, conducted in 1977 and 1978, revealed that the largest "catch per unit effort" for shrimp occurred just north of Dog River and off of East Fowl River.

4.08 Bottom sediments in the proposed disposal area are classified as silty sand, clayey silt, and sand-silt-clay mix. According to Parker (1973), the productivity of the benthos and nekton is closely tied to the kinds of sediments on or in which animals live. Unconsolidated sediments with the highest standing crops are usually poorly-sorted sand-silt-clays or clayey sands of sandy silts, while the poorest sediments for animal life are well-sorted, pure fine sands or clays (Parker, 1969). Parker (1973), however, included the upper third of Mobile Bay in his classification of areas which were least sensitive to increased or additional disturbance. May (1973) in a study on dredging indicated that both standing crop and diversity are lower on the west side of the bay than on the east side and that the ship channel seemed to form an effective barrier between the habitats.

4.09 Parker (1960) described the upper bay bottom which would be filled as supporting river-influenced, low-salinity benthic assemblages. Approximately 20% of the bay is characterized in this manner. The dominant benthic organism in this portion of the bay and down to Dog River is the brackish water clam, *Rangia cuneata*. Clams smaller than 30 mm are utilized as food by many fishes, crabs, and ducks. Hopkins, *et al* (1973) has examined *Rangia* as an overall indicator organism which could be used to determine the effects of engineering works on the biota of coastal waters. The most critical factor in determining the future of *Rangia* population is in the pulsing of freshets into an embayment, which would not be changed by implementation of this alternative. Although the remaining population outside the fill area would not be directly affected, the fill would destroy a large percentage of the existing populations.

4.10 The Brookley Expansion area would abut an existing man-made fill area. This area is characterized by about 70 acres of marsh which has voluntarily established along the shoreline. Plant species mainly include Panicum sp., Phargmites communis (common reed), Hydrocotyle umbellato (Pennywort), Iva frutescens (marsh-elder), Myrica cerifera (wax myrtle), Quercus nigra (Water Oak), Zizania aquatica (wild rice), Spartina patens (salt meadow hay), Silax nigra (black willow), Cladium jamaicense (sawgrass), Baccharis halimifolia (groundsell tree), Typha latifolia (common cat-tail), Daubentonia punicea, and Pinus sp. A large part of the wetlands area has been significantly disturbed by trash dumping and fill activities. Construction of the Brookley Expansion area disposal site would eliminate this wetland area. The recommended plan provides for a marsh establishment program which will offset the wetlands loss. This and other mitigation features are discussed in detail in section 6.

4.11 Interim guidelines for the disposal of dredged or fill material into navigable waters were promulgated by the Environmental Protection (EPA), pursant to section 404(b) PL 92-500, and printed in the Federal Register of 5 September 1975. These guidelines have evolved along with research on the impacts of dredged material disposal. As a result, the interim guidelines indicate that the elutriate test, total sediment analyses (bulk analyses), and bioassays may be used to evaluate the chemical-biological interactive effects of the disposal of dredged material. The elutriate test was developed by the Corps of Engineers (COE) and the EPA to determine the potential release of contaminants in the dredged material to the receiving water column. The advantage of the elutriate test is that it simulates the mixing of sediment and water that occurs during the dredging process, however, it does not take into account additional dilution after discharge. To the extent permitted by the state of the art probable effects on sensitive marine organisms can best be estimated by appropriate bioassays. Bioassays are procedures that use living organisms to detect or measure presence of available toxic, inhibitory, or stimulatory substances. As with the elutriate test static bioassays represent a worst-case situation since the test does not take into account dilution or mixing by water currents and dispersion as would occur at a disposal site.

4.12 A number of detailed studies have been conducted in Mobile Bay over the past decade evaluating the effects of open water disposal of dredged material. Recent studies conducted as a part of the overall COE Dredged Material Research Program have utilized both the elutriate and bioassay techniques of analysis. Results of these studies are summarized in following paragraphs.

4.13 Windom (1973) investigated changes in heavy metals concentrations resulting from maintenance dredging of the Mobile Ship Channel. Metals studied were: iron cadmium, copper, lead, mercury, and zinc. He concluded that dispersion by dredging is not followed by metal releases of any significant quantity except briefly in the case of zinc and iron. It was further determined that variations in levels of various metals in waters of Mobile Bay showed no relation to dredging activities but appeared to be more influenced by natural processes such as runoff. Slightly increased levels of metals in the water column were found near the discharge end of the dredge pipeline but these were very localized. May (1973) had similiar findings when studying channel dredging in lower Mobile Bay. He concluded that the dredge effluent did not increase the levels of dissolved heavy metals.

4.14 Lee et.al. (1978) conducted a water quality study related to the June 1976 Mobile Ship Channel maintenance dredging near Middle Bay Light. Modified elutriate tests performed with the channel sediments and site water prior to dredging indicated that manganese and iron would be released to the water column. Both nickel and copper were removed from the waters while no significant changes occurred for cadmium, chromium, zinc, and lead. Total ammonium and ammonia also displayed a tendency to be released to the water column. Bioassays were performed with the elutriate waters to determine the effects on grass shrimp Palaemonetes pugio. No toxcity was observed during the 96-hour tests. Results of field tests of the actual dredge discharge were comparable to the elutriate tests but indicated only local increases in pollutional constituents in the water column directly associated with the initial mud-water matrix discharged from the dredge pipe. As a result of the Mobile Bay study and similar studies of other dredging projects, Lee et.al. concluded that the relatively rapid dispersion of any released contaminants at the disposal site creates a situation where the likelihood of significant toxicity or bioaccumulation of contaminants present in the dredged sediments is very small.

4.15 Shuba, Carroll, and Wong (1977) conducted algal bioassays utilizing Dunaliella tertiolecta exposed to various combinations of elutriate and disposal site water concentrations for Arlington Channel. They asserted that an algal bioassay of the elutriate could indicate the bioavailability of constituents released from dredged material and the possible effect on phytoplankton productivity at the disposal site. Elutriate anaylses indicated ammonia-nitrogen, TOC and TIC were released from all of the Arlington Channel sediments sampled. Some orthophosphate was removed by all sediments. For the heavy metals, manganese and to a more limited extent lead and nickel were released for all sediments. Results of the bioassay analysis indicated a trend of inhibition to the growth of D tertiolecta. When nutrients were added to the elutriates growth yield increased significantly. Since ammonia nitrogen was released from all sediments a separate experiment was conducted using D terciolecta and concentrations of ammonium up to 49 ppm. The ammonium study demonstrated that the concentrations of ammonium plus ammonia found in the elutriates were not toxic to the test alga. It was suggested that the algal growth in the bioassays could have been affected by the high concentrations of manganese in the elutriates.

4.16 In 1974 the Mobile District Corps of Engineers collected sediment core samples from along the alinement of the Mobile and proposed Theodore Ship Channels. Analyses (data contained in sections B and D of Appendix 5) included physical, chemical, heavy metals, bacteriological, and pesticides by the bulk analyses technique, and elutriate analyses for chemical and heavy metals constituents. Results of the elutriate analyses for the sandy upper bay sediments were similiar to the elutriate findings of Lee et.al. (1978) and Shuba et.al. (1977) in that the nutrient related constiutents, such as ammonia nitrogen and total kjeldahl nitrogen, displayed the greatest potential to be released to the water column. Analyses of heavy metals in the dike construction material, however, indicated only nickel and zinc would be released to the water column. The EPA Quality Criteria for Water, 1976, indicates that concentrations of nickel below 100 ppb should not be harmful to marine organisms. The concentrations of nickel associated with the dredging operation are well below that value (54.5 ppb). Although there are no specific criteria for zinc the increased concentrations would be relatively small. Based on the results of the previously discussed studies of dredging activities in Mobile Bay, any release of pollutional constituents to the water column would be expected to be transitory and limited to the immediate vicinity of the discharge point.

4.17 Lackey, et.al. (1973) studied the effects of maintenance dredging of the Mobile Ship Channel on selected biological parameters. It was concluded from the study that the dredging did not influence the concentrations of coliform bacteria in the water around the discharge, in the sediments of the disposal area, or in the sediments elsewhere. Consequently dredging and disposal of the dredged material for the proposed project would not be expected to modify water quality from a bacteriological standpoint.

4.18 Water quality in the vicinity of the disposal operation will be affected by high chemical and biochemical oxygen demands associated with finely-sorted channel sediments. Resuspension of these sediments results in a temporary reduction in dissolved oxygen. Lee et.al. (1978) associated depressed dissolved oxygen levels to the high suspended solid concentrations in the immediate vicinity of the dredge discharge point.

4.19 Increased turbidity and suspended solids concentrations would be associated with the island and expansion area during construction and stabilization. The term turbidity properly refers to optical properties of water having to do with light adsorption and scatter, but turbidity is commonly attributed to suspended sediments alone. It is used in this sense to refer to a broad spectrum of conditions, varying from what can essentially be considered a highly fluid mud, having several grams of particulates per liter, to particle suspensions of a few milligrams per liter, which appear clear to the eye. Varying ranges of turbidity are experienced in most aquatic ecosystems, including Mobile Bay (15-100+JTU's), to which resident fauna and flora are adapted (Hirsch, et.al. 1978). Background suspended solids values have been documented to range from 4 to 144 mgl (May, 1973) for Mobile Bay.

4.20 May's study (1973), for disposal of dredged material in the lower bay, indicated turbidity on the surface did not exceed 35(JTU) above ambient level beyond 400 feet from the end of the discharge pipe. At mid depth this value extended to a maximum distance of 1,200 feet in one direction but was otherwise confined to within 600 feet of the discharge point. High concentrations of suspended solids in the form of a fluid mud layer along the bay bottom extended out to a distance of at least 1,800 feet.

4.21 Nichols and Thompson (1978) conducted a study of turbidity and fluid mud flows associated with Mobile Ship Channel maintenance dredging near Middle Bay Light in June 1976. The discharge was conducted with a 24 inch pipe submerged five feet below the water surface at approximately a 30° angle. Results of the study indicated that the disposal increased suspended solids in near-surface water above background in a zone extending about 1,000 feet along the axis of a plume from the discharge point. Corresponding near-bottom concentrations extended more than 1,950 feet and laterally about 1,300 feet from the discharge point. The discharge plume disappeared within two hours after the dredge discharge was stopped. An estimated 99 percent of the dredged material accumulated as dense suspensions of fluid mud along the bay bottom with concentrations ranging from 10 to 480 g/1. The fluid mud extended more than 1,600 feet from the discharge point at a thickness of about five inches.

4.22 Brett (1975) conducted a sediment dispersion study of the maintenance dredging operation studied by Windom and Lackey. It was reported that the dredged material moved from the discharge as a meandering stream and occasionally resurfaced. These patches of suspended material occurred for a maximum distance of 2,000 to 3,000 feet from the point of discharge. Mud flows were observed to move a distance of about 5,000 feet, while small concentrations of fine materials move up to 4,000 from the discharge. Brett also concluded that turbidity produced by dredging settles out within one to two days, and that the dredged material probably stablizes in at least nine months and then becomes difficult to resuspend because of the high concentration of clay particles contained in the dredged material.

4.23 The disposal operations would increase suspended solids throughout the area during the period of construction and stabilization of the dikes, which may involve a period of several years. Heavy suspended solid concentrations would be expected in the area of construction, but small quantities of colloidal-sized particles of dredged material would be transported by currents and tides and could be expected to visibly increase turbidity over a wide spread area of the bay. The area that would be influenced by excessive turbidity would include the disposal site and those areas which would be temporarily disrupted by mud flows. Under worst-case conditions, utilizing the findings of Brett (1975), during construction of the upper bay expansion area approximately 1,300 acres of water bottoms west of the ship channel off Brookley would be subject to impact by mud flow in addition to the 1,710 acres of bay bottom committed to the disposal area.

4.24 Conceptualized impacts of excessive turbidity and suspended material which may be encountered in the bay include interference with filter-feeding activities of invertebrates, irritation and clogging of the gills of fishes, and interference with plant photosynthesis due to shading effects. The responses of aquatic organisms to turbidity are frequently difficult to determine because they may be due to a wide variety of causes, including, but not limited to, the following: concentration of suspended solids, the number of particles in suspension, their densities, size distribution, shape, minerology, sorptive properties or presence of organic matter and its form; inherent physical, chemical, and biological characteristics of each site; and antagonistic and synergistic effects. Other variables, such as the interaction between the solids, temperature, and dissolved oxygen, frequently affect aquatic organisms before and during the increase in turbidity. For a more precise understanding of the impacts due to turbidity suspended solids and mud flows on the natural resources of Mobile Bay, the following parameters are discussed in more detail: habitat, primary productivity, benthic assemblages (benthos), invertebrates, plankton, nekton, fishes, and aesthetics.

4.25 As discussed in paragraph 4.21 the area around the disposal site would be blanketed with a thin layer of material which would obviously result in habitat alteration. According to St. Amant (1972) investigations in Louisiana into the effects of dredging activities on normal benthic populations indicate that the findings in those areas differ to some extent and in many cases are highly variable. In general it is recognized that during the initial disposal operation those benthic organisms in the immediate vicinity of the discharge are severely disturbed and either scattered or destroyed. However, the disposal areas tend to restore themselves in a short period of time. This is expected since most of the animals are naturally short-lived and have a high reproductive capacity. This type of biological resilience furnishes the mechanisms required for survival of populations of such lower animal forms. St. Amant (1972) indicates that the disposal areas would be expected to be repopulated within a normal growth season.

4.26 Studies by Oliver, et. al. (1977) indicate that organisms, especially polychaetes, initially recolonizing dredged material were not the same as those which had originally occupied the site and consisted of opportunistic species whose environmental requirements were flexible enough to allow them to occupy the disturbed areas. According to studies by Hirsch et.al. (1978) trends toward reestablishment of the original communities were noted within several months after disturbance and complete recovery was approached within one year. Vittor (1974) noted that in D'Olive Bay, Alabama, benthic invertebrate standing crop was decreased by dredging and the mud flow was responsible for significant prolonged loss of infauna biomass. Although an overall 28 per cent decrease in benthic invertebrate biomass occured, benthic species diversity was not significantly lowered.

4.27 Laboratory tests at the Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi indicate that most motile inhabitants of the substrate are able to move vertically through dredged material. However, the physical characteristics of the sediment overburden are very important in the process of vertical migration. The laboratory tests show that when dredged material is physically similiar to that in which the animals normally occur, there is little problem in accomplishing veritcal migration. During the tests the majority of animals were able to migrate vertically through approximately 12.5 inches of dredged material. Although these studies duplicate to some extent the conditions which might occur during a typical disposal operation, there are obviously some parameters which are not duplicated. However, generally it would appear that animals, especially polychaetes, do migrate through dredged material since they are found in the disposal material shortly after the operation ceases.

4.28 A decrease in the depth of the lighted or euphotic zone usually accompanies increased turbidity (Sherk, 1971). As a result, the most frequently cited negative aspect of dredged material disposal is the reduced photosynthetic activity due to the interference of light penetration. However, the addition of suspended material can also stimulate photosynthesis by increasing the available nutrients (Stern and Stickle, 1978). Turbidity and suspended materials produced as a result of natural and/or mans activities can therefore either promote or inhibit primary production, and can be of substantial importance. Because so little information is available on the relationship between dredging activities and primary productivity, it is difficult to relate the time duration of turbidity caused by dredging, and the dilution around the disposal site, to the time required for algal stimulation or inhibition. According to Flemner (1970) short term dredging, as in maintenance operations, usually produces only temporary effects, and upon cessation of dredging primary productivity returns to normal levels. Becuase of the amount of fines associated with the dredged material it is expected that phytoplankton productivity would essentially be eliminated in the immediate area of dike construction during the discharge operation and for a short time thereafter until the dikes become stabilized.

4.29 Suspended sediments may also affect the abundance of planktonic forms and be of direct harm to zooplankton, fishes, and motile invertebrates. Several studies suggest that suspended particles raised by dredging have no gross effects on the diversity or abundance of zooplankton nor the composition of fish eggs and larvae (Dovel, 1970; Goodwyn, 1970). However, other investigations indicate that periodic resuspension of silts and clays by repeated dredging or wind and wave action may adversely affect the general metabolism of adult plankters and both metabolism and metamorphosis of fish eggs and larvae as well as other developmental stages (Sherk, 1971, and 1972; Livingston, et.al., 1972). Simon and Dyer (1972) indicate that clumping and flocculation of plankton with suspended particles and subsequent settling to the bottom decreases planktonic populations. Lackey, et.al. (1973) and Markey, et.al. (1975) report a transitory decrease in the immediate vicinity of the dredge discharge during maintenance dredging.

4.30 Turbidity and suspended material may affect fishes directly or indirectly. Direct effects according to Stern and Stickle (1978) could include lethal agents and those factors that influence physiological activities (reproduction, growth, development) or produce abrasive wear on tissue. Indirect effects include modifications to habitats and food chain organisms. Recent data, based upon weight/volume concentrations of suspended solids, from several closely monitored laboratory studies are probably more indicative of natural responses of adult fishes to suspended solids (Stern and Stickle, 1978). The results of these studies have indicated that adult fishes, as well as invertebrates, are affected by a complex interaction between suspended solids, temperature, and dissolved oxygen. A correlation exists between normal habitat and sensitivity to suspended solids with the most tolerant species being the bottom dwellers while the filter feeders are the most sensitive. High suspended solids would be less harmful in winter than in summer and fishes as a group are more sensitive to suspended solids than many of the invertebrates studied to date.

4.31 Based on Stern and Stickle (1978) and studies conducted in D'Olive Bay Alabama by Vittor (1974) most fishes usually migrate out of the dredging area and gross effects to fishes are rarely observed. Patterns of seasonal occurrance, abundance, species diversity, and conditions of the gill filaments among fishes exposed to dredging operations and dredged material disposal generally remain unchanged. Under normal circumstances fish avoid turbid waters and have the ability to clear membranes of accumulated silt upon entering undisturbed water. Most studies have indicated that upon exposure to temporary increases in turbidity and suspended material similiar to that encountered in areas where dredging or the disposal of dredged material has occurred no permanent effects were exhibited.

4.32 The turbidity associated with the open water dike construction and stabilization would be aesthetically displeasing to some people. Most complaints from the general public concerning maintenance dredging and shell dredging involve localized turbidity and/or disturbances which for a period of time may reduce localized fishing success in the vicinity of the operations. David (1971) found that although water pollution is perceived by the general public to be of increasing concern and that the public has rather definite ideas about what constitutes a description of pollution, very often aesthetic criteria are used. She discovered that the most widely used indicators of water pollution seem insufficient in light of the public definition of and concern about water pollution. Therefore the degradation to asthetics associated with the project is of importance and would be minimized to the extent practicable.

4.33 In response to concern over the potential impact of suspended solids and turbidity associated with dredged material disposal one task within the Corps of Engineers Dredged Material Research Program, conducted at the Waterways Experiment Station, was to evaluate methods for controlling the dispersion of dredged material. Results of the studies indicate that the most promising method for controlling water column turbidity and mud flows involves modifying the pipeline configuration at the discharge point. It was found that the amount of water column turbidity generated by a submerged discharge decreases as the angle of the pipeline discharge increases from 0 to 90 degrees. By adding a 15 degree conical section at the end of the 90 degree elbow, the effective velocity of the discharged slurry can be reduced by a factor of 2 or 3 (without affecting the dredge's production rate). This decreases the levels of water-column turbidity and increases the mounding tendency of the fluid mud. Laboratory tests involving the control of dredged material dispersion have resulted in the development of a submerged diffuser system (figure 3). Although the diffuser has not been field tested, it has a great deal of potential for most effectively eliminating turbidity in the water column and maximizing the mounding tendency of the discharged dredged material, thereby minimizing the aerial coverage of the fluid mud flow. The slurry remains in the pipeline/diffuser until it is discharged at a low velocity near the bottom, thus preventing any interaction of the slurry with the water column above the diffuser. This eliminates water column turbidity as well as any depression of the dissolved oxygen levels in the water column. A system for control of dredged

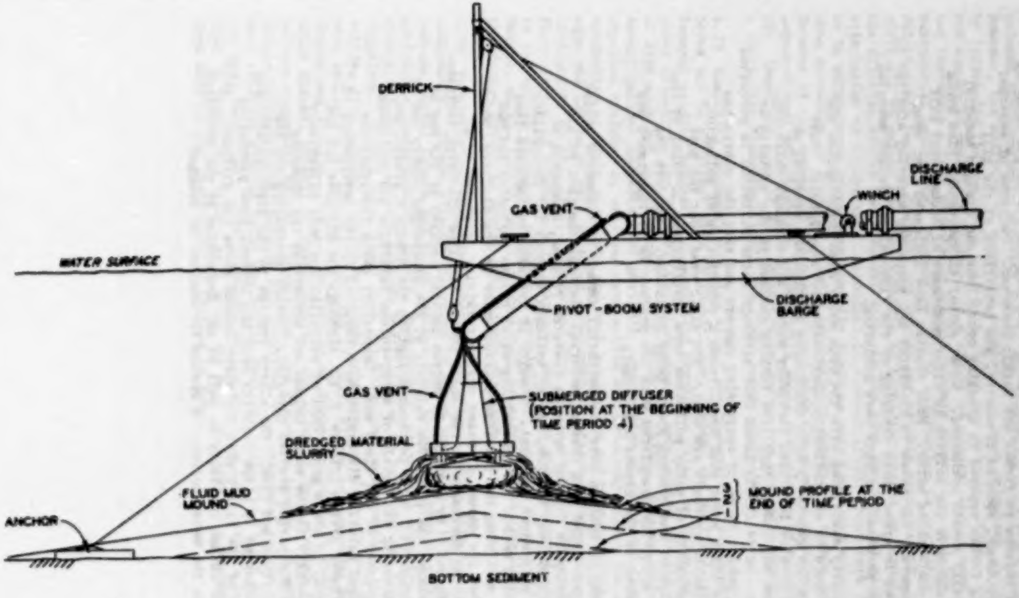

DERRICK
DISCHARGE LINE
WINCH
GAS VENT
WATER SURFACE
DISCHARGE BARGE
PIVOT - BOOM SYSTEM
GAS VENT
SUBMERGED DIFFUSER (POSITION AT THE BEGINNING OF TIME PERIOD 4)
DREDGED MATERIAL SLURRY
FLUID MUD MOUND
3
2
1
MOUND PROFILE AT THE END OF TIME PERIOD
ANCHOR
BOTTOM SEDIMENT

Figure 3
SUBMERGED DIFFUSER DISPOSAL SYSTEM

material dispersion would be environmentally beneficial for the open water dike construction in the upper bay, and will be considered further post-authorization studies.

4.34 Results of engineering and environmental monitoring studies to be conducted in conjunction with construction of the disposal island for the Theodore Ship Channel project, as discussed in Section 1, will be utilized in developement of the disposal plan for the upper harbor area. Also, results of the Mississippi Sound study currently being conducted will be beneficial to the Mobile Harbor project. These studies will be coupled with a bay usage study to be developed and conducted during post-authorization studies. The purpose of the usage study will be to define biological productivity, gather water quality data, and predict recreational potential for various sections of the bay. This will provide a better comparative analysis of the environmental impacts of the bay disposal operations.

4.35 After completion of the open water dike construction the remaining new work material from the upper bay would be placed within the confines of the expansion area The impacts of disposal would be minimal with sufficient ponding and proper placement of the weirs to provide drainage from the disposal areas toward the open portion of the bay.

4.36 Impact of Offshore Disposal. Under the proposed plan approximately 58,654,000 cubic yards of new work material from the lower bay channel, south of Theodore, and an average annual volume of 4.1 million cubic yards of maintanance material from the entire bay channel would be excavated by hydraulic dredge utilizing dump scows and tow boats to transport the material to a gulf disposal area. During construction of the bar channel approximately 19,019,000 cubic yards of material would be removed by hopper dredge and dumped in a gulf disposal area(s). On an average annual basis about 379,000 cubic yards of maintenance material would be dredged from the modified bar channel and placed offshore.

4.37 The location of offshore dredged material disposal sites would have to be designated by the EPA in accordance with the 11 January 1977 Ocean Dumping Criteria, developed pursuant to the Marine Protection, Research, and Sanctuaries Act of 1972, PL 92-534. In selection of the disposal site the criteria requires that in addition to other necessary or appropriate factors determined by the EPA, the following factors would be considered:

(1) Geographical position, depth of water, bottom topography and distance from coast;

(2) Location in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases;

(3) Location in relation to beaches and other amenity areas;

(4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release;

(5) Feasibility of surveillance and monitoring;

(6) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;

(7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);

(8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean;

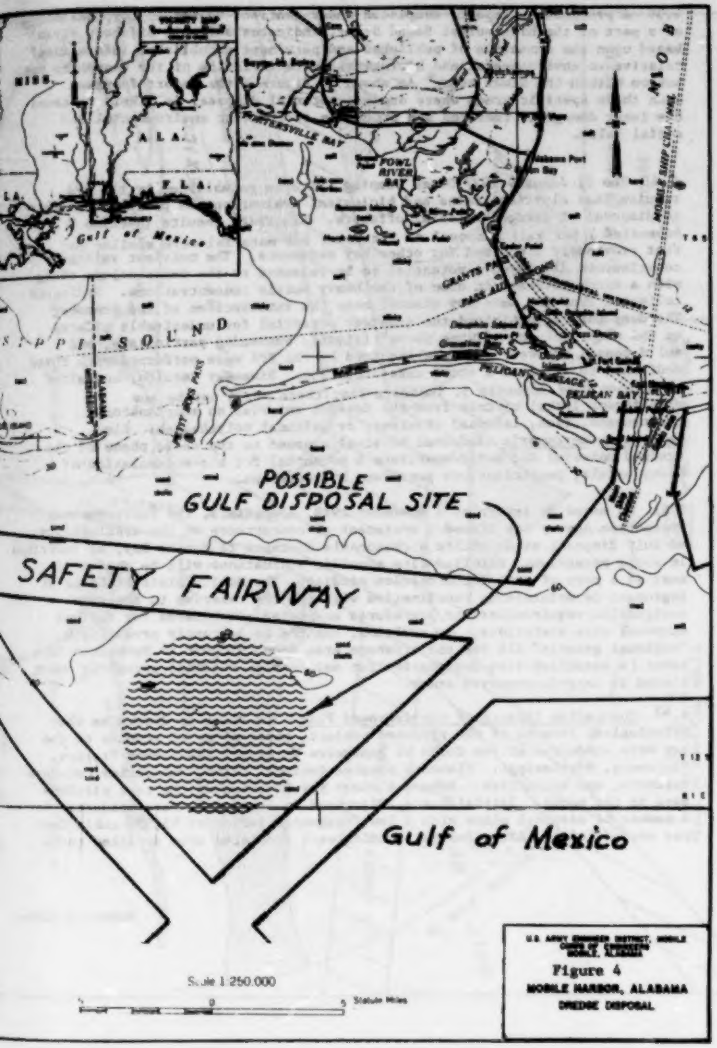
(9) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;

(10) Potentiality for the development or recruitment of nuisance species in the disposal site;

(11) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

The results of a disposal site evaluation and designation study based on the above criteria would be presented in an environmental impact statement prepared by the EPA.

4.38 One area being considered for a new gulf disposal site is located about 16 miles southwest of the mouth of Mobile Bay in water exceeding 70 feet deep (figure 4). The disposal area would cover approximately 24,600 acres. According to Vittor (1977) the area is characterized by a coarse to medium sand bottom with occasional clusters of shell hash. Two varieties of bivalve, Ammonia beccarii, abundant in the area, are tolerant to a high degree of stress. Their presence in abundance appears to reflect the influence of heavy sedimentation of fine material from the Mississippi and Mobile Rivers. However, it is doubtful that these forms could tolerate the large quantities of material resulting from the proposed project. Personnel of the Dauphin Island Sea Laboratory have indicated that the general area is characterized by a nepheloid layer at various times of the year, but that an abundant and diverse standing crop is quickly established whenever it is absent. This suggests a high degree of ecosystem resilience. Prevailing currents within 30 miles of Dauphin Island travel from east to west. Consequently, a gradual shifting of the lighter sediments to the west is expected.


MISS.
ALA.
FLA.
LA.
Gulf of Mexico
PORTERSVILLE BAY
FOWL RIVER BAY
GRANTS PASS
PASS AUX HERONS
PELICAN PASSAGE
PELICAN BAY
MOBILE SHIP CHANNEL
MOBILE B
SOUND
POSSIBLE
GULF DISPOSAL SITE
SAFETY FAIRWAY
Gulf of Mexico
Scale 1:250,000
0
5
Statute Miles

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

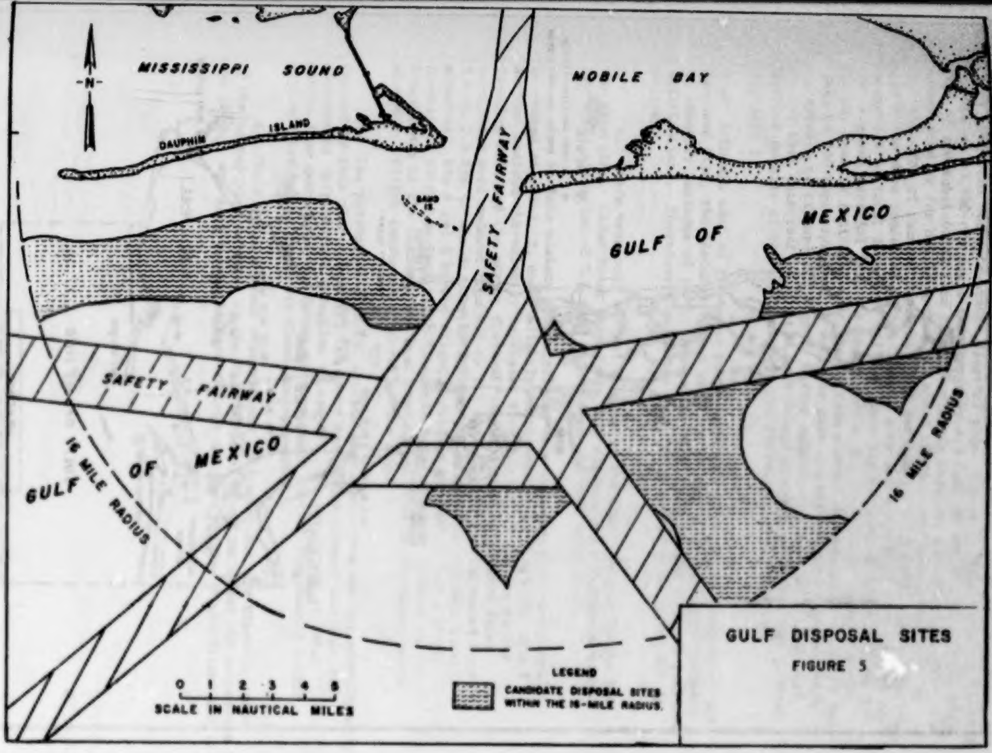
Figure 4
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL

4.39 A preliminary report, completed under contract by TerEco Corporation, as a part of the Mississippi Sound Study, indicates suitable offshore sites based upon the summation of published and pertinent unpublished information relative to environmental and biological characteristics of the nearshore sea bottom within the study area. As shown on figure 5 the report focuses upon those specific areas where dredged material disposal is likely to cause the least damage to features and processes of greatest environmental and social value.

4.40 The 11 January 1977 Ocean Dumping Criteria established by the EPA require that elutriate tests and biological evaluations be performed prior to disposal of dredged material offshore. Elutriate results (Section D Appendix 5) for gulf disposal of the lower bay material were similar to that previously discussed for other bay sediments. The nutrient related constituents displayed a potential to be released to the water column along with a minor increase in some of the heavy metals concentrations. Sediments collected from the main bay channel near the intersection of the proposed Theodore Channel exhibited the greatest potential for undesirable effects on the water column. "Three phase" (liquid, suspended particulate, and solid phase) bioassay analyses required by the EPA were performed with these sediments to simulate a worst-case situation. Bioassay results, contained in Section D of Appendix 5, indicate that there would not be any significant lethal effects from the dredged material on zooplankton, crustaceans, fish, infaunal bivalves, or infaunal polycheates. Also, Mercenaria mercenaria (Infaunal bivalve) exposed to the solid phase of the dredged material did not demonstrate a potential for bio-accumulation of heavy metals, pesticides, or petroleum hydrocarbons.

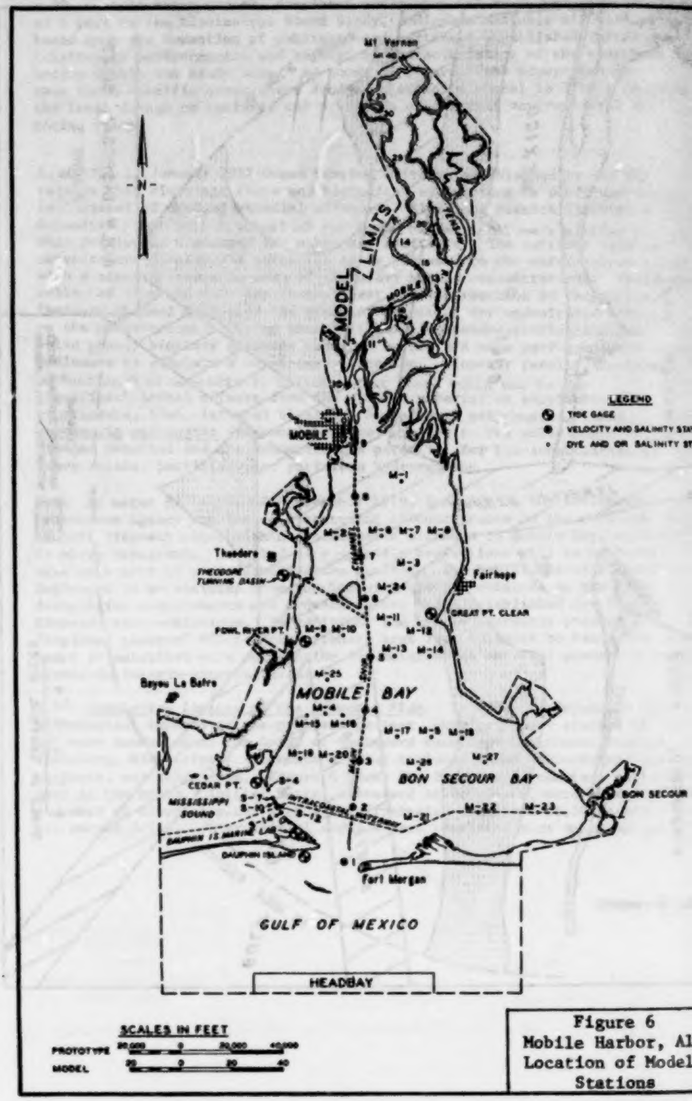
4.41 As noted by letter of 2 November 1979, Appendix 3, the Environmental Protection Agency has issued a statement of concurrence on the availability of Gulf disposal sites within a reasonable distance to Mobile Bay, as described in above paragraphs. Detailed site specific evaluations will be conducted next as a part of post-authorization studies. The Mobile District Corps of Engineers is maintaining coordination with the EPA relative to the site designation requirements and procedures are being established for further disposal site evalutions. In addition, the EPA is currently preparing a "regional generic" EIS for the offshore area from Gulfport to Pensacola in order to establish site designation for maintenance material presently being placed in interim-approved areas.

4.42 Cumulative Impacts of the Proposed Plan. In order to determine the hydrological impacts of the proposed project, physical model studies of the bay were conducted at the Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi. Elements studied included tides, velocities, surface currents, and salinities. Figure 6 shows the location of the test stations used in the model. Initial tests, discussed in Section 6, were conducted for a number of disposal plans with a low freshwater inflow of 15,500 cubic feet per second (cfs). After initial studies were completed more detailed tests


MISSISSIPPI SOUND
MOBILE BAY
-N-
DAUPHIN ISLAND
SAND IS
SAFETY FAIRWAY
GULF OF MEXICO
SAFETY FAIRWAY
GULF OF MEXICO
16 MILE RADIUS
16 MILE RADIUS
0 1 2 3 4 5
SCALE IN NAUTICAL MILES
LEGEND
▨ CANDIDATE DISPOSAL SITES WITHIN THE 16-MILE RADIUS.

GULF DISPOSAL SITES

FIGURE 5


Mt Vernon
-N-
MODEL LIMITS
MOBILE
TENSAW
MOBILE
Theodore
THEODORE TURNING BASIN
Fairhope
GREAT PT. CLEAR
FOWL RIVER PT.
Bayou La Batre
MOBILE BAY
BON SECOUR BAY
CEDAR PT.
MISSISSIPPI SOUND
INTRACOASTAL WATERWAY
DAUPHIN IS MARINE LAB
DAUPHIN ISLAND
Fort Morgan
BON SECOUR
GULF OF MEXICO
HEADBAY
LEGEND
TIDE GAGE
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MODEL 20 0 20 40

Figure 6
Mobile Harbor, Al
Location of Model
Stations

were conducted for a favorable disposal plan, figure 7, with a mean freshwater inflow of 63,500 cfs and a tide range of 2.3 feet at the Dauphin Island gage. Due to the substantial lead time required to complete the tests in phase with other studies for Mobile Harbor the model studies were conducted prior to optimization of channel dimensions and refinement of disposal plans. As such, the tests were conducted with a 50-foot deep and a 500-foot wide channel as suggested by local interests and the upper bay disposal plans accounted for maintenance material from the upper harbor channel. Final results of the survey studies indicated that the optimum channel dimensions would be 55 feet deep by 550 feet wide, and it would be more economical and environmentally acceptable to transport the upper harbor maintenance material to the gulf rather than construct the Little Sand Island disposal area for that purpose. Further details of the study process are discussed in Section D of Appendix 5.

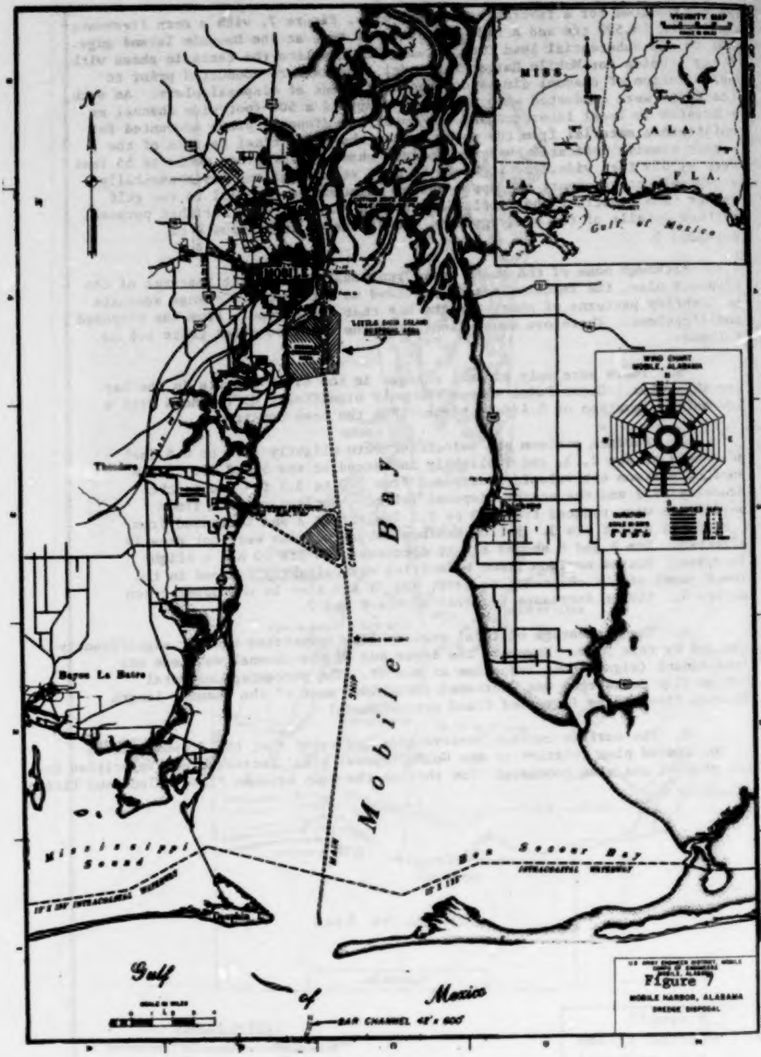
4.43 Although none of the model tests represented the exact features of the proposed plan, the features tested provided an increment of change adequate to identify patterns of change in the bay that could result from the proposed modifications. Therefore conclusions from the detailed model tests are as follows:

a. There were only minimal changes in the tidal heights in the bay for this plan. Cedar Point showed the only significant differences with a low-water elevation of 0.4 feet higher than the base condition.

b. Surface maximum ebb velocities were slightly (0.4 to 0.5 fps) decreased at sta 2, 3, and 9 slightly increased at sta 5 and 10. Sta 8 surface maximum ebb velocity increased from 3.0 to 3.7 fps due to the Brookley fill and the nearby disposal island. Surface maximum flood velocities were reduced from 2.3 to 1.7 fps at sta 2 and increased from 0.8 to 1.5 fps at sta 3. Bottom maximum ebb velocities were not greatly affected. Sta 6 and 8 showed slight decreases and sta 10 had a slight increase. Bottom maximum flood velocities were slightly reduced in the lower reach of the channel (sta 1, 2, and 3) and also in the upper reach at sta 9. Slight increases occurred at sta 6 and 7.

c. The percentage of total surface flow downstream was not significantly changed by this plan. However, the lower end of the channel was less ebb predominant (significant reduction at sta 3). The percentage of total bottom flow downstream was decreased throughout most of the channel length (bottom flow had an increased flood predominance).

d. The surface current observations indicated that the disposal areas of the tested plan relative to the Gulf Disposal plan: increased ebb velocities in the channel and also increased flow through the pass between Pinto Island and Little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MOBILE
LITTLE SAND ISLAND DISPOSAL AREA
Theodore
Bayou La Batre
Mobile Bay
SHIP CHANNEL
MAIN SHIP CHANNEL
Mississippi Sound
Bon Secour Bay
INTRACOASTAL WATERWAY
Gulf of Mexico
BAR CHANNEL 42' x 600'
VICINITY MAP
MISS.
ALA.
FLA.
LA.
Gulf of Mexico
WIND CHART MOBILE, ALABAMA

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

Figure 7

MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL

Sand Island. During strength of ebb, the diagonally cross channel velocities south of the disposal island are increased relative to the Gulf Disposal plan.

e. The average surface and bottom salinity over a tidal cycle in the bay increased for stations in the upper bay and near the channel. Average salinity in the lower bay was significantly reduced east of the navigation channel, while station salinities west of the channel usually increased. There seems to be an increased supply of saltwater from the enlarged channel and a greater storage of freshwater in the Bon Secour Bay area.

f. Changes in maximum or minimum salinities in some regions were quite different from those of the average salinity. In many cases, the maximum salinity was more severly changed than was the average.

g. The salinity intrusion length up the Mobile River was increased at the bottom depths for this mean freshwater inflow.

h. The average surface salinity was increased in all four critical oyster bed areas. The maximum increase was 2.1 ppt. Bottom average salinities were increased at the areas south of the Theodore Channel (+1.6°/oo) and reduced at Whitehouse (-1.1°/OO) and Klondike (-2.2°/oo) critical areas. Status quo was maintained at Cedar Point critical area.

4.44 The proposed plan resulted in moderate changes in surface and bottom salinities in the upper bay. The greatest increases occurred near the channel for both surface (+2.5 °/oo) and bottom salinities (+3.4 °/oo). Although a moderate freshening of the bottom waters of the nearshore stations was evident, the general trend was to increase the upper bay salinities. This finding, in conjunction with the widespread freshening of Bon Secour Bay (5.9 °/oo highest average top and bottom change at the station having the greatest change), strongly suggests that Mobile Bay's existing hydrographic characteristics would be significantly modified. The maximum freshening in Bon Secour observed at any one locality in the bay was at station M-5 (about four miles SSW of Mullet Point) and was 11.7 °/oo on the bottom over a single hour in the tidal cycle. Additionally, bottom salinities at this station were decreased at least 6 °/oo during 96% of the tidal cycle.

4.45 These changes are the apparent result of the deepened channel which increases the salt wedge intrusion up the Mobile River. The dense salt wedge apparently plugs much of the channel and restricts the southward flow of the less dense freshwater which is consequently diverted within the distributary system toward the eastern branch, the Tensaw, somewhere in the upper delta. This water sweeps the eastern shore and results in the overall freshening of Bon Secour Bay. An additional factor which intensifies the freshening effect apparently relates to the relationship of the channel size and the salt wedge in the lower bay. It is possible that the hydraulics of the enlarged channel prevent the salt wedge from creeping up and eastward into Bon Secour Bay, consequently reducing its supply of highly saline gulf water. This tends to increase the freshening effect since the lost saline waters would be replaced by riverine and partially mixed bay waters having less salt content. Although additional investigation is required, it is possible that this change would resemble the manner in which the lower bay operated prior to ship channel construction.

4.46. The impacts resulting from this change are widespread and effect almost every environmental feature within the bay. Some of the changes are obviously beneficial, others are negative or harmful. The direction of most of the changes is unknown. Although the impacts cannot be analyzed in detail at this level of investigation, they include:

1. A decrease in the waste assimilative capacity within the Mobile River.

2. Increased turbidities along the eastern shore.

3. Long-term alteration of marsh types within the Bon Secour Bay.

4. Increased oyster producing area within Bon Secour Bay with the possibility of improved spatfall.

5. Increased frequency of closure to shellfish harvesting of Bon Secour Bay.

6. Unquantified changes in the overall nursery value of Mobile Bay.

7. Alteration of the flushing characteristic of Mobile Bay as determined by dye diffusion studies.

8. Alteration of larvel migratory pathways.

4.47 The basic goal of the model studies is to develop a plan that will maintain as near as possible the existing general pattern of circulation and the salinity regimen throughout the bay. Therefore additional model tests would have to be conducted for the proposed plan during post-authorization studies to determine the effects of the 55-foot deep channel and required mechanisms for offsetting significant hydraulic effects of the enlarged channel.

4.48 Two dredges could be operating continuously during construction of the proposed project. In conjunction with this a possibility exists that a number of dredges could be simultaneously operating in various portions of Mobile Bay for an extended period. Presently, maintenance dredging of the existing Mobile Harbor project requires about eight dredge-months per year. Normally the work is accomplished with one dredge but occasionally two are employed. Inclusion of maintenance dredging from the propsoed Theodore project would approach twelve dredge months per year, which would be accomplished with two or three dredges. The dredging of dead reef oyster shell is conducted in the bay on a year round basis. Smaller dredges operating infrequently and for much shorter periods of time are employed in maintaining Fowl River, Dauphin Island Bay, Fly Creek, Bon Secour River, and the Gulf Intracoastal Waterway.

4.49 Implementation of the proposed plan would, in effect, involve open water disposal of dredged material in the upper bay during the construction period. Adverse impacts associated with the various dredging projects within the bay relate to open-water disposal. The major adverse impacts include turbidity, siltation and mud flows, and loss of benthic invertebrates. These effects are generally localized and are confined to the duration of the dredging operation. Since maintenance dredging of the proposed project would not involve open-water disposal in the bay, the dredging-related cumulative impacts of the project with other activities would only occur during the construction period. As discussed in paragraphs 4.08 and 4.23 the maximum area of the bay which would be subject to excessive suspended solids movement during construction would be 2.7 square miles committed to the disposal area and 2.0 square miles attributed to mud flows. The construction period estimated at seven years, would progress simultaneously with operation of the shell dredge and the channel dredges in maintenance of the Mobile Ship Channel and the Gulf Intracoastal Waterway. Other mentioned projects are either very small, sufficiently removed, or involve confined disposal and are not considered significant relative to the entire bay. The total maximum area of the bay which would be subject to excessive solids movement instantaneously as a result of the shell dredge and channel maintenance dredges is about 3.5 square miles. Thus implementation of the plan would increase the total maximum area of the bay subject to excessive suspended solids movement from about 3.5 square miles to nearly 8.2 square miles for the period of construction and stabilization of the dikes in the upper bay. Although a maximum of 8.2 square miles may be affected if operation of all the dredges did, in fact, overlap, the long term cumulative effects on the bay would be less than under the existing maintenance disposal practices since after construction of the project is complete the only open water disposal in the bay would be from the shell dredge, introcoastal waterway and some of the other mentioned small projects.

4.50 Based on the discussions in section B of the Appendix 5, construction of the proposed project could affect some sites of historical interest. A complete cultural resources survey would be required prior to new channel construction and the use of new disposal areas. A remote sensing survey would have to be conducted at all water construction and disposal areas, including the offshore site. Delineated anomalies located within construction or disposal areas, if not avoided, might require an evaluation of significance for the National Register of Historic Places in accordance with the National Historic Preservation Act of 1966, PL 89-665.

4.51 Impact of Project on Threatened Fish and Wildlife. Implementation of the proposed project is not expected to have significant detrimental effects on threatened fish and wildlife which may appear in the area. All of the construction activities within the bay will be in areas that have been subject to disturbance by periodic maintenance dredging, dredging for fill, or port related activities. Proper contact has been made with the US Fish and Wildlife Service implementing coordination procedures in accordance with the Endangered Species Act of 1973. By letter of 14 October 1980, Appendix 3, the Fish and Wildlife Service, Jackson, Mississippi, indicates that "although several Federally-listed species may occur within the project area, they would not be affected by the proposed activity."

4.52 Secondary Impacts of the Proposed Project. As discussed in Section D of the Survey Report, certain socio-economic trends expected to occur in the area under the "no action" plan would be incited by an unquantifiable amount with construction of the proposed project. There would be an increase in population, employment, housing, industrial and commerical development, water borne commerce, and port expansion. As the population in the study area continues to grow more land now used for other purposes will be converted to urban and built-up uses. This is particularly true for the heavy growth areas west of Mobile and south to Theodore. Baldwin County is also becoming more attractive to residential growth. Concomitant commerical development is expected to occur in the areas of residential development. The location of the industrial spine in Mobile is not expected to change significantly, although the demand for industrial land will increase. Industrial growth is projected to expand primarily along upper Mobile Bay, north along the Mobile River, and south in the Theodore Industrial Park. Expansion of port terminal and handling facilities is also expected to occur with the proposed upper bay disposal site being a primary area of expansion.

4.53 Increased dock activity is not expected to affect the displacement of residental dwellings. There is little residential development in the immediate area of expansion. Most of these existing houses are in delapidated conditions and are subject to urban renewal programs.

4.54 Aesthetic values in the project area are expected to undergo changes as the region responds to the need for industrially developed land and expanded harbor facilities. This expansion can be expected to reduce the amount of open space lands, and render the area less desirable for recreational activities.

4.55 Selection of the proposed plan would not be expected to significantly affect community cohesion in the Mobile SMSA. Certain groups within the region would regard the harbor improvements as a major boost to the economic well-being of the study area while others would be skeptical of alterations to the bay.

4.56 Anticipated growth will create conflicting demands for the study areas' fresh water resources. Much new industry is locating in the region to take advantage of the resource. Continued population growth will also require large amounts of fresh water.

4.57 Water pollution associated with the increased development of the area will be a major concern. As indicated in Section B, of Appendix 5, a water quality management plan for Mobile and Baldwin Counties has been developed by the South Alabama Regional Planning Commission in compliance with Section 208 of PL 92-500. In order to effectively improve water quality and assure attainment of water quality goals, the 208 study indicates that a regional structure is needed to coordinate the various city and agency water quality plans and standards. Such a structure would also facilitate the study of point and non-point sources of pollution and other water quality problems from a basin-wide perspecitve on a continuine basis. If the recommendations of the 208 study are adopted locally, certified by the Governor and approved by the Environmental Protection Agency, then the South Alabama Regional Planning Commission, in conjunction with the Alabama Water Improvement Commission, will be assigned the responsibility to carry out the area-wide management program.

4.58 Since the study area is predicted to experience a continued growth level, the Division of Air Pollution control, Bureau of Environmental Health, which monitors Mobile County's air quality, is presently developing an Air Quality Maintenance Plan for the County. The plan, which is mainly concerned with particulates, will cover the twenty-year period from 1975 through 1995, and will indicate the ambient air levels resulting from increased growth. It will then determine what, if any, additional regulatory measures will be necessary. New industrial development in the county will be subject to stringent regulations and extensive studies will be required to insure that the standards will not be violated as result of the new development. Since most of the study area's industrial growth is expected to occur in Mobile County, Baldwin County is not projected to experience serious degredation to its air quality. It's also expected that when final compliance with Federal automobile emission standards is achieved, there will be a substantial reduction in the photochemical oxidant level. Stringent controls of new industrial development will also be necessary to assure this.

4.59 Noise in the Mobile Harbor area will result primarily from truck and automobile traffic and the operation of heavy machinery associated with loading and unloading at the docks. Since harbor activity is expected to increase it is assumed that noise levels will also rise but not reach the tolerance levels discussed in section B of Appendix 5.

5.01 ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED. Unavoidable adverse impacts associated with the project would arise from the dredging and disposal operations which would destroy some benthic populations, increase turbidity, and cause physical loss of some bay bottom habitat and recreational/fisheries areas. There are also other adverse impacts that can be avoided only if remedial measures can be established. These are associated with modifications to overall circulation patterns in the bay caused by channel construction, and sites of historical interest, if any, located within the channel alinement and disposal areas. Secondary impacts would result from economic development of the area enhanced by the project construction.

5.02 Benthic populations would be destroyed by project operations due to channel construction and layers of sediment deposited on the bottom by mud flows during disposal. The amount of bay bottom that would be affected during construction would be about 5.8 square miles including; (a)1.1 square miles due to widening the bay channel, (b)2.7 square miles for the expansion area and (c)2.0 square miles attributed to mud flows during construction of the disposal area. The 2.7 square miles committed to the disposal area would result in permanent loss of esturaine habitat and recreational/fisheries use of that portion of the upper bay. In addition the offshore area affected by the dredging and disposal operatons would include 0.8 square miles for modifications to the bar channel and an unquantified area committed to the gulf disposal sites. This will be addressed further in an EIS to be prepared by the EPA.

5.03 A minor release, to the water column, of nutrient related constituents and some heavy metals would occur during the open water disposal operations. The release of pollutional constituents would be expected to be transitory and limited to the immediate vicinity of the discharge point. Reduced dissolved oxygen levels would be associated with the initial high levels of turbidity and suspended solids near the discharge point. Increased turbidity would temporarily reduce photosynthesis and, hence phytoplankton, the base of many food chains, would be reduced during the construction period. However, turbidity and mud flows can be minimized by modifying the pipeline configuration at the discharge point. There will also be short-term effects from air pollution and increased noise levels during the dredging operations.

5.04 According to model studies modifications to the bay ship channel would cause a change in the overall salinity distribution within Mobile Bay. This is the apparent result of the deepened channel which increases the salt wedge intrusion up the Mobile River. Additional model tests would have to be conducted for the proposed plan during post-authorization studies to determine the effects of the 55-foot deep channel and, if needed, mechanisms for offsetting significant effects of the enlarged channel.

5.05 A complete cultural resources survey of the bottom areas to be affected would have to be completed prior to project construction. Magnetometer surveys of the areas may reveal numerous anomalies. Measures would have to be taken to protect and preserve objects or sites of historical significance, if any, within the channel alinement and disposal areas.

5.06 Secondary impacts of the project would include higher levels of noise, water, and air pollution related to increased economic development of the area. There would be an increase in population, employment, housing, industrial and commercial development, water borne commerce, and port expansion. However, the basic patterns and general magnitude of growth are expected to occur with or without the project.

6.01 ALTERNATIVE TO THE PROPOSED ACTION. As discussed in Section D of Appendix 5, various alternative plans were formulated based upon study objectives to fulfill the needs of the Mobile Bay area. Specific features considered in plan formulation included not only navigation improvements but also the possibility of investigating measures other than identified navigation problems.

6.02 Since any structural alternative would involve excavation of large quantities of material from Mobile Bay, early plan formulation studies concentrated on determining the economic and environmental impacts associated with various dredging and dredged material disposal techniques. It was determined that a hydraulic pipeline dredge would be the most desirable technique for excavation with disposal options of upland, open bay, construction of diked or bulkheaded island and fill areas, or utilization of a fleet of dump scows for Gulf disposal. A hopper dredge could be used for the entrance channel due to the closeness of deep water disposal areas. Other dredging and disposal techniques were eliminated because they were too costly, involved untried and inflexible methods, or utilized foreign equipment to perform the dredging which would not be allowed under current United States Government policy.

6.03 Early studies addressed not only modifications to the existing bay channels but also possibly deepening and widening the proposed Theodore channel. As a result of the initial screeing an array of dredged material disposal options was developed which include:

a. Mobile Bay Island or Fill Alternatives - Five variations of this concept involving dredged material disposal islands and fill areas in both upper and lower Mobile Bay were evaluated. The island and fill areas were considered to contain all new work and maintenance material for a 50 year period. Figures 8, 9, 10, 11, and 12 are illustrative of the five similar plans.

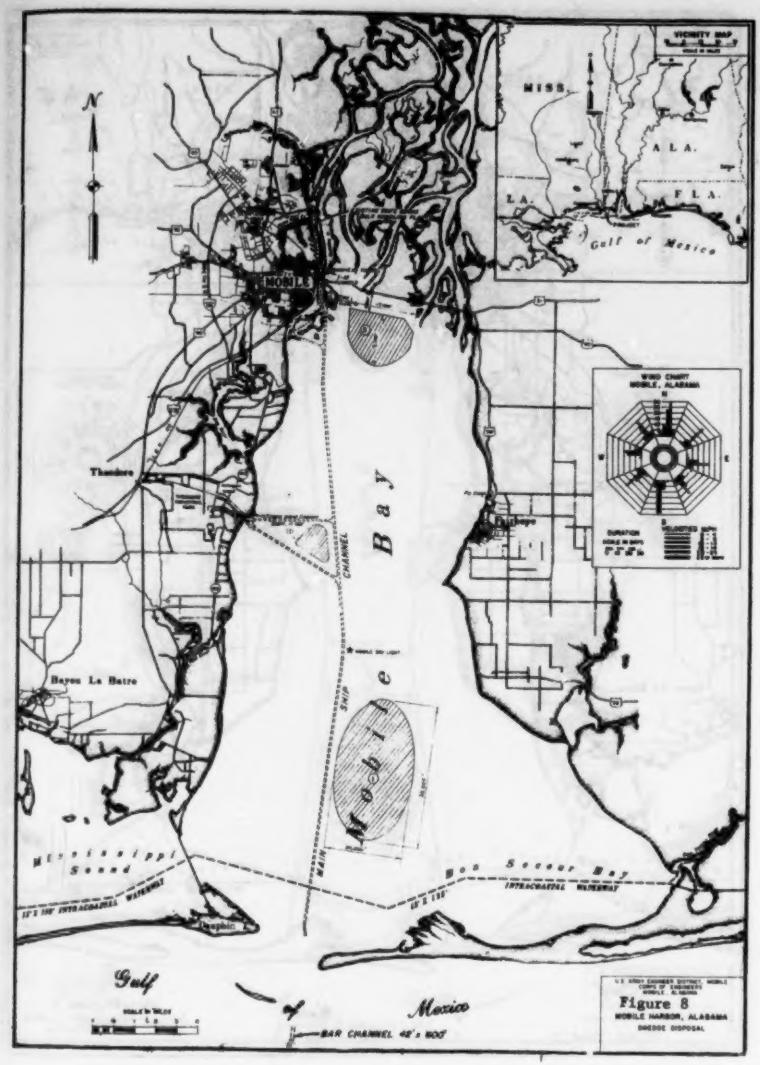
b. Open Water Disposal Alternative -

(1) Removal of all new work and maintenance material to the Gulf of Mexico (Figure 13).

(2) Disposal of all new work and dredged maintenance material along the channels in Mobile Bay in accordance with current practice (Figure 14).

(3) Removal of all new work material to the Gulf of Mexico and deposition of all maintenance material in open water adjacent to the channel in accordance with current practice.

c. Upland Disposal - This alternative involves removal of all new work and dredged maintenance material for a period of 50 years to upland disposal sites as show on Figure 15.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VICINITY MAP
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MOBILE
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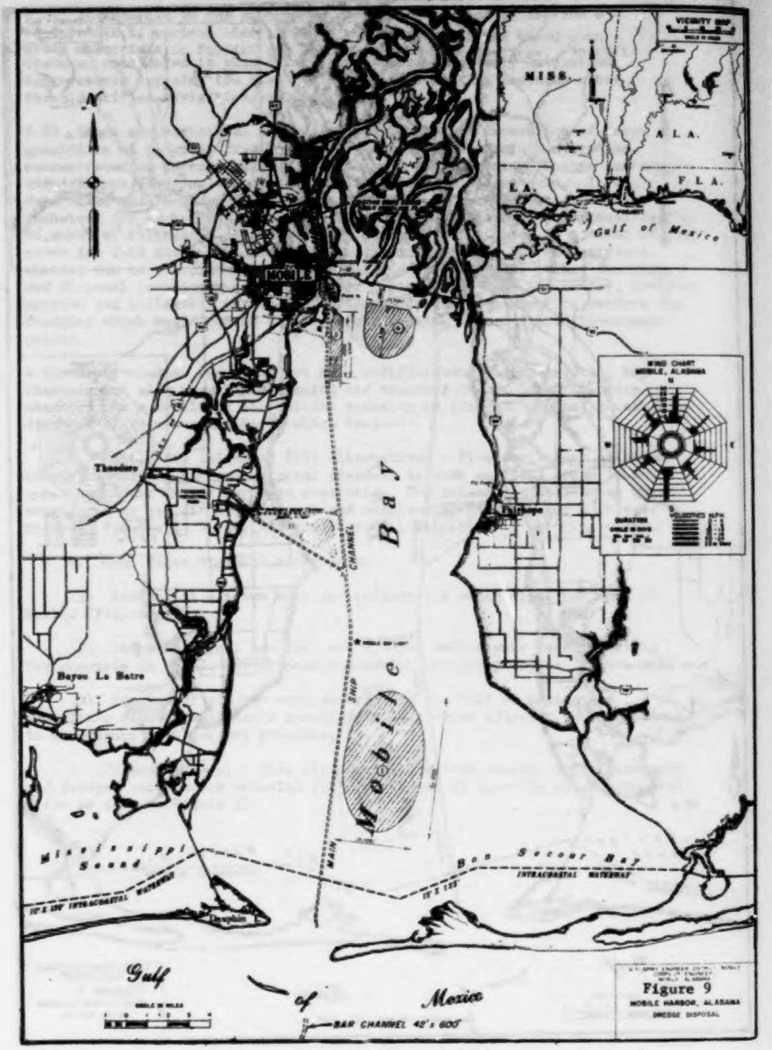
MOBILE, ALABAMA
Theodore
Mobile Bay
MAIN SHIP CHANNEL
Bayou La Batre
Mississippi Sound
INTRACOASTAL WATERWAY
Dauphin
Bon Secour Bay
Gulf of Mexico
BAR CHANNEL 42' x 600'

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

Figure 8
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL



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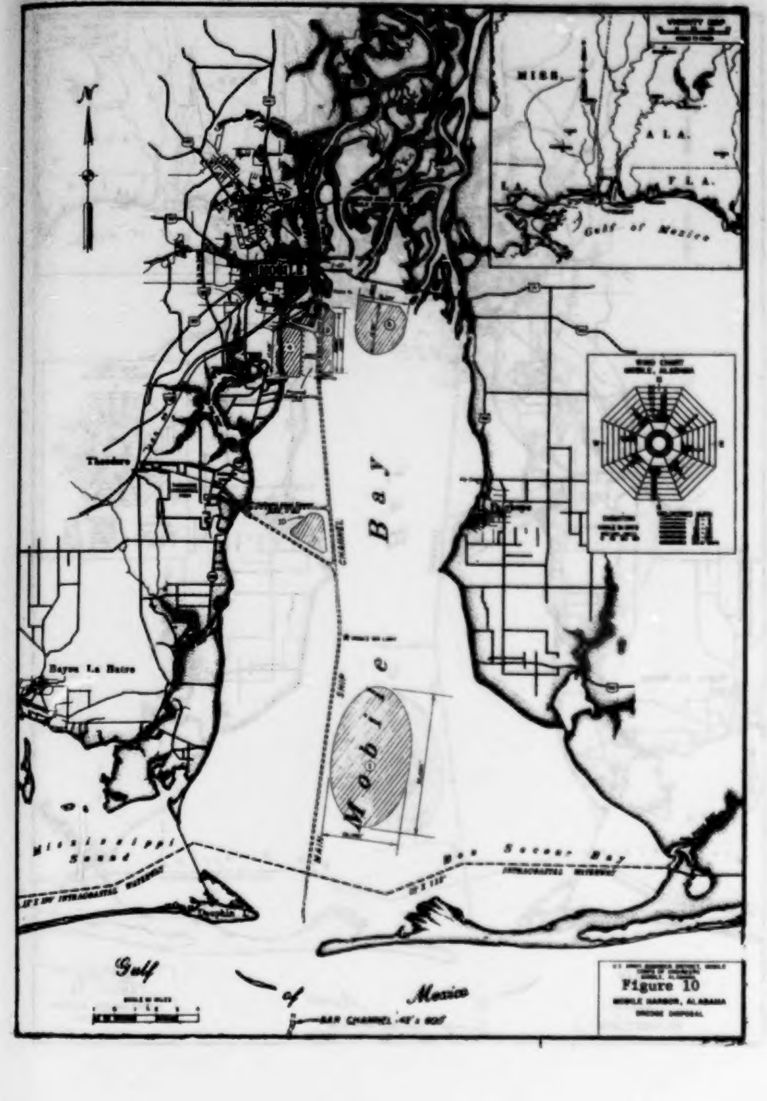
Mississippi Sound
Bon Secour Bay
12' X 125' INTRACOASTAL WATERWAY
INTRACOASTAL WATERWAY
Dauphin
Gulf of Mexico
BAR CHANNEL 42' x 600'

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

Figure 9
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL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Mississippi Sound
Bon Secour Bay
INTRACOASTAL WATERWAY
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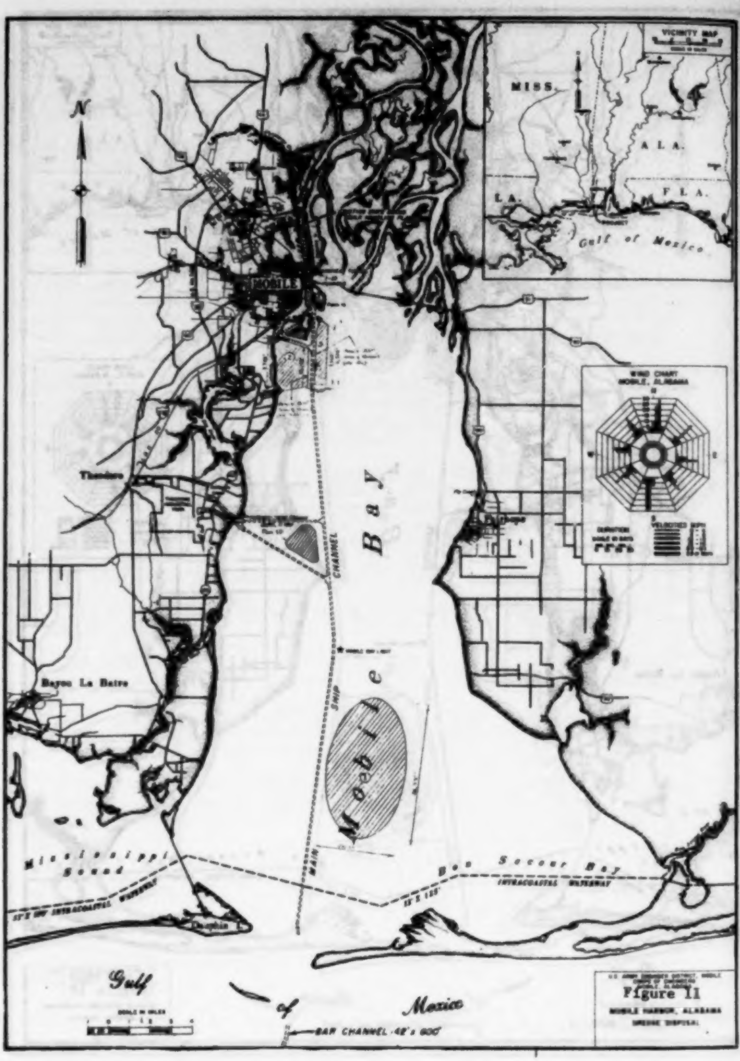
Gulf of Mexico
BAR CHANNEL 42' x 600'

Figure 10
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL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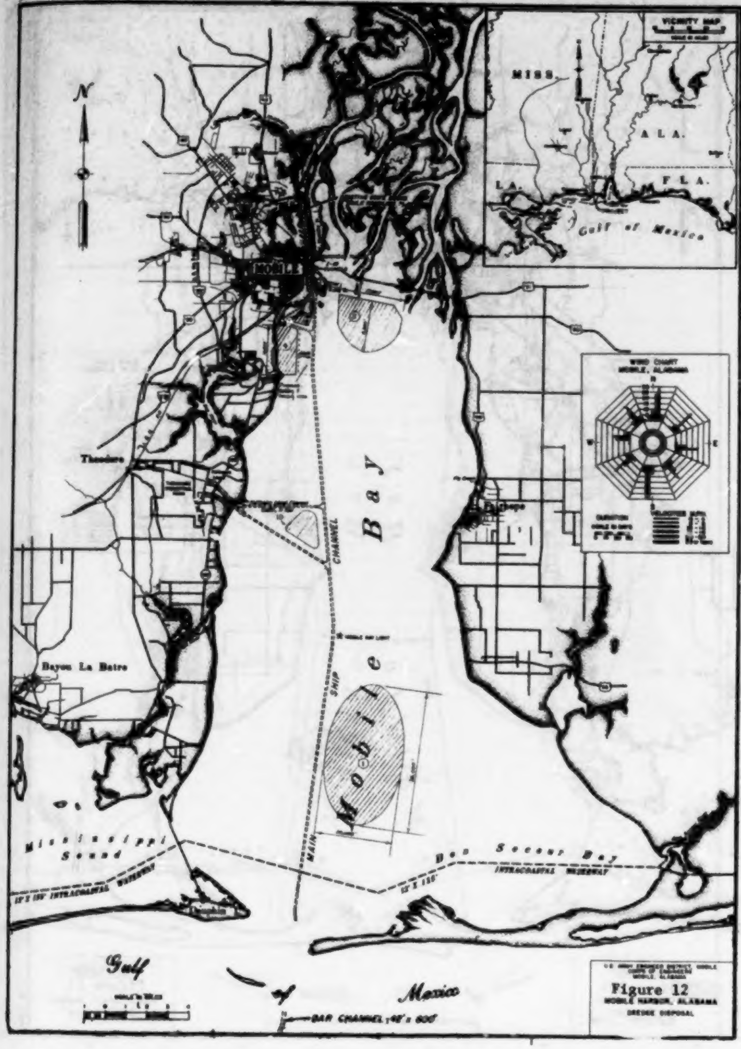
Mobile Bay
MAIN SHIP CHANNEL
Mississippi Sound
Bon Secour Bay
INTRACOASTAL WATERWAY
Dauphin
Gulf of Mexico
SCALE IN MILES
BAR CHANNEL 42' x 600'

Figure 11

MOBILE HARBOR, ALABAMA

DREDGE DISPOSAL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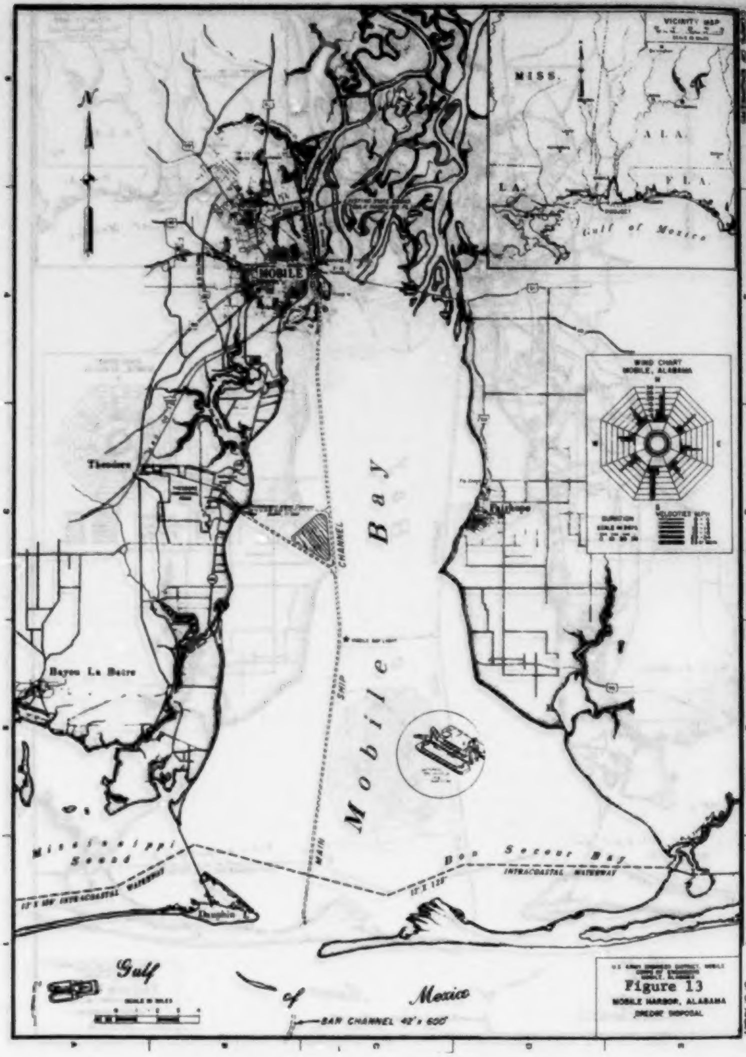
Mobile Bay
Mississippi Sound
Bon Secour Bay
INTRACOASTAL WATERWAY
12' X 150' INTRACOASTAL WATERWAY
12' X 150'
Dauphin
Gulf of Mexico
BAR CHANNEL 42' x 600'

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

Figure 12
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL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MOBILE, ALABAMA
Bayou La Batre
Mobile Bay
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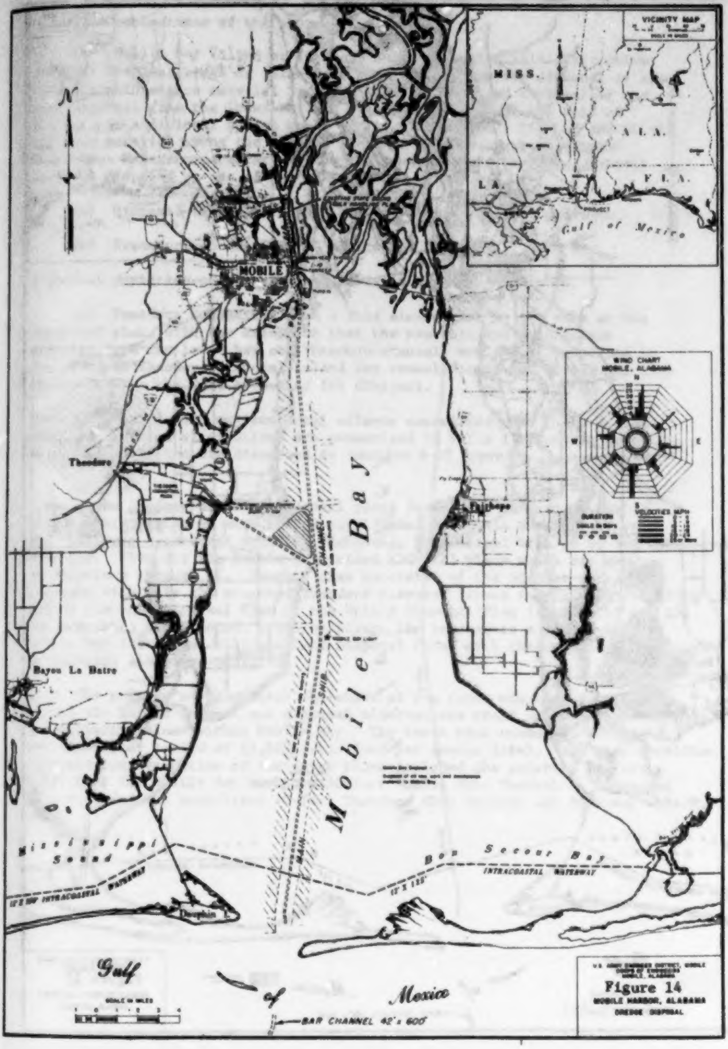
Mississippi Sound
Bon Secour Bay
12' X 150' INTRACOASTAL WATERWAY
12' X 125' INTRACOASTAL WATERWAY
Dauphin
Gulf of Mexico
BAR CHANNEL 42' x 600'
SCALE IN MILES
U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA
CORPS OF ENGINEERS
U.S. ARMY

Figure 13
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL


VICINITY MAP
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DURATION
VELOCITIES MPH
N
MOBILE
Theodore
Fairhope
Bayou La Batre
Mobile Bay
SHIP CHANNEL
MAIN SHIP CHANNEL
Mississippi Sound
Bon Secour Bay
INTRACOASTAL WATERWAY
12' X 150' INTRACOASTAL WATERWAY
12' X 125'
Dauphin
Gulf of Mexico
SCALE IN MILES
BAR CHANNEL 42' x 600'

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

Figure 14
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL

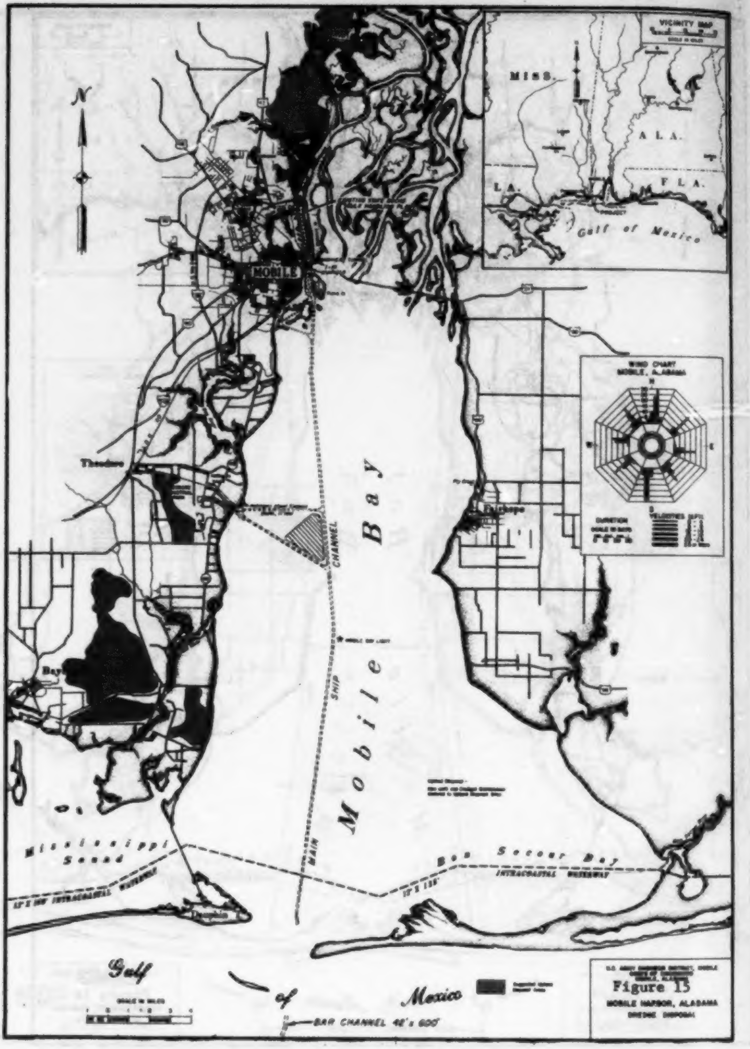

N
VICINITY MAP
MISS.
ALA.
LA.
FLA.
Gulf of Mexico
MOBILE
WIND CHART
MOBILE, ALABAMA
Theodore
Fairhope
MAIN SHIP CHANNEL
Mobile Bay
Mississippi Sound
Bon Secour Bay
12' X 150' INTRACOASTAL WATERWAY
INTRACOASTAL WATERWAY
Dauphin
Gulf of Mexico
BAR CHANNEL 42' x 600'

Figure 15
MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL

d. Combinations of the above -

(1) Mobile Bay Island or fill and Gulf Disposal - This alternative includes disposal areas or islands in upper Mobile Bay for disposal of new work and maintenance material from the upper channel and disposal of new work material from the lower bay and Theodore channels in the Gulf of Mexico. An additional option would be for disposal of a limited amount of new work material along the western shore of the bay to abate erosion problems. Maintenance material from the lower bay and Theodore channels would be disposed by one of two options.

(a) Disposal in Mobile Bay in accordance with current practice.

(b) Transport to the Gulf of Mexico for disposal.

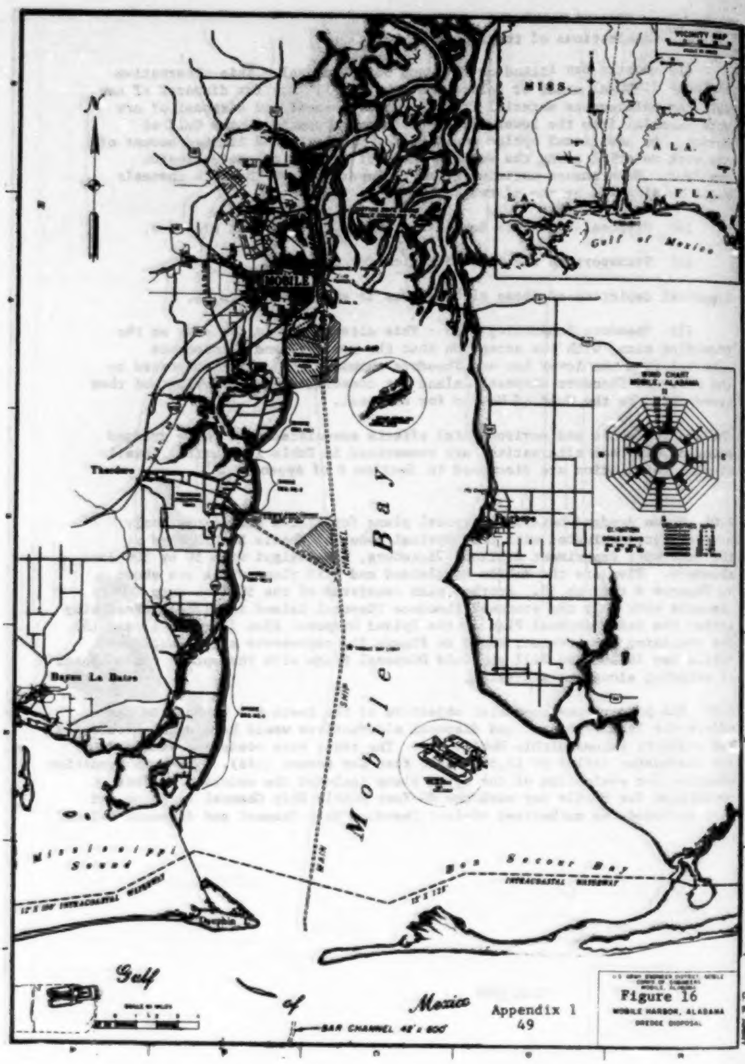
A general depiction of these alternatives is shown on Figure 16.

(2) Theodore Rehandling Plan - This alternative is the same as the preceding plan, with the exception that the new work and maintenance material from the lower bay and Theodore channels would be transported to the proposed Theodore disposal island for consolidation and drying and then transported to the Gulf of Mexico for disposal.

The socioeconomic and environmental effects associated with these dredged material disposal alternatives are summarized in Table 1. Further details of plan formulation are discussed in Section D of Appendix 5.

6.04 Seven dredged material disposal plans formulated during the early studies were evaluated with the physical model of Mobile Bay located at the Waterways Experiment Station, Vicksburg, Mississippi with 50 by 500 foot channels. Five are the Mobile Bay Island and Fill plans which are shown on Figures 8 through 12. Another plan consisted of the 50-foot deep channels with only the proposed Theodore Disposal Island in place representing either the Gulf Disposal Plan or the Upland Disposal Plan (Figures 13 and 15). The remaining plan tested, shown on Figure 16, represents a combination of Mobile Bay Island and Fill and Gulf Disposal Plans with the option for disposal of material along the shoreline.

6.05 The primary environmental objective of the tests was to analyze the effect the larger channel and disposal alternatives would have upon circulation and salinity values within Mobile Bay. The tests were conducted with a low freshwater inflow of 15,500 cubic feet per second (cfs). The base condition selected for evaluation of the seven plans included the existing project conditions for Mobile Bay with the 40-foot Mobile Ship Channel in place and also included the authorized 40-foot Theodore Ship Channel and disposal island.


VICINITY MAP
MISS.
ALA.
LA.
FLA.
Gulf of Mexico
N
MOBILE
Theodore
Bayou La Batre
WIND CHART MOBILE, ALABAMA
SHIP CHANNEL
Mobile Bay
Mississippi Sound
Bon Secour Bay
12' x 150' INTRACOASTAL WATERWAY
INTRACOASTAL WATERWAY
12' x 125'
Dauphin
Gulf of Mexico
BAR CHANNEL 42' x 600'

Appendix 1
49

U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS
MOBILE, ALABAMA

Figure 16

MOBILE HARBOR, ALABAMA
DREDGE DISPOSAL

[illegible]

Effect on:	Mobile Bay Island or Fill All new work and maintenance material to confined disposal islands located in Mobile Bay.	Open Water Disposal Removal of new work and maintenance material to Gulf of Mexico.	Disposal of new work and maintenance in Mobile Bay in accordance with current practice.	Removal of new work to Gulf of Mexico and disposal of maintenance material in Mobile Bay in accordance with current practice.	Upland Disposal New work and maintenance material transported to upland disposal sites.	Mobile Bay Island or Fill and Gulf Disposal Maintenance material in Mobile Bay in accordance with current practices.	Maintenance material transported to Gulf of Mexico.	Shoreline disposal of some new work. Maintenance material in Mobile Bay in accordance with current practice.
Land Use	These plans would create additional land adjacent to the Brookley area, which could be used for industrial and/or port expansion.	No significant effects.			This plan would affect potential land use. The designated areas would be used for disposal during construction and for maintenance over the project life, thus precluding their use for other purposes.	This plan would create additional land area adjacent to the Brookley area which could be used for industrial and/or port expansion.		[illegible]
Local Government Finance	The three plans which would create land for industrial and/or port expansion would have slightly beneficial effects on the ability of local government to finance infrastructure. Additional land should have high property value from potential location of industrial activity. If land used for port expansion, port revenue would be generated and could be invested in developing port facilities.	No significant effects.			[illegible] would be [illegible]. Real property and sales taxes will be foregone, thus directly affecting the ability of local government to provide services and facilities. Increases in property values would be [illegible]. The growth in demand for public services and facilities would be reduced in the disposal areas.	Same effects as Mobile Bay Island or Fill.		
Displacement of People	No significant effects	No significant effects			Designated disposal areas are sparsely populated but some displacement of farms, homes, and people would occur.	No significant effects		
Community Cohesion	No significant effects	No significant effects			Displacement of homes, farms, and people and changed land use could alter the pattern of social and economic cohesion.	No significant effects		There would likely be opposition to this plan by [illegible] businesses which could disrupt community cohesion.
Water Quality	Localized turbidity during construction of disposal islands. Minor release of heavy metals or other pollutants at the disposal areas. Possible alteration of circulation patterns.	Localized impacts of turbidity and minor release of heavy metals or other pollutants at gulf disposal area. Less significant than impacts of unconfined bay disposal of maintenance material	Adverse impacts of turbidity and minor release of heavy metals or other pollutants with disposal of large quantities of dredged material in Mobile Bay. Possible alteration of circulation patterns.	Localized impacts of turbidity and minor release of heavy metals or other pollutants at gulf and bay disposal areas. Impacts of gulf disposal of new work less significant than impacts of unconfined bay disposal of the material	Shallow aquifers may be influenced by salt water in dredge material. [illegible]	Localized turbidity during construction of upper bay islands and fill area and during gulf and unconfined bay disposal. Minor release of heavy metals or other pollutants at disposal sites. Impacts of gulf disposal less significant than impacts of unconfined bay disposal of new work material. Possible alteration of circulation patterns.	Localized turbidity during construction of upper bay islands and fill area and during gulf disposal. Minor release of heavy metals or other pollutants at disposal areas. Impacts of gulf disposal less significant than impacts of unconfined bay disposal. Possible alteration of circulation patterns.	Localized turbidity during construction of upper bay islands and fill area, during shoreline disposal, during gulf disposal and during [illegible] bay disposal. Minor release of heavy metals or other pollutants at the disposal areas. Possible alteration of circulation patterns.
Wetlands	Possible destruction of salt water marsh and grass beds during construction of upper bay island and fill areas.	No effects	No effects	No effects	Filling of fresh water swamp and possible filling of salt water marsh.	Possible destruction of salt water marsh and grass beds during construction of upper bay island and fill areas.	Possible destruction of salt water marsh and grass beds during construction of upper bay island and fill areas.	Possible destruction of salt water marsh and grass beds during construction of upper bay island and fill areas and along shoreline disposal areas.
Aquatic Environment	Loss of bay bottom habitat with island construction.	Destruction of marine organisms at Gulf disposal area. Impacts less severe than impacts of unconfined bay disposal.	Destruction of marine organisms with large quantities of material placed unconfined in bay.	Destruction of marine organisms at Gulf disposal area. Impacts less severe than unconfined bay disposal of new work dredge material. Destruction of marine organisms associated with open water disposal of maintenance material in Mobile Bay. Impact more severe than under current practice because of larger quantity material involved.	Possible damage to fresh water habitat [illegible]	Loss of bay bottom habitat from island and fill areas in upper bay. Destruction of marine organisms in Gulf disposal area. Impacts less severe than unconfined bay disposal of new work dredge material from lower bay. Destruction of marine organisms associated with open water disposal of maintenance material in lower Mobile Bay. Impact more severe than under current practice because of larger quantity material involved.	Loss of bay bottom habitat from island and fill areas in upper bay. Destruction of marine organisms at Gulf disposal area. Impacts less than those of unconfined bay disposal.	Loss of bay bottom habitat from island and fill areas in upper bay. Adverse impacts on shallow water environment near shoreline disposal area. Destruction of marine organisms associated with open water disposal of maintenance material in lower Mobile Bay. Impact more severe than under current practice because of larger quantity material involved.
Terrestrial Environment	No adverse effects. Creation of wildlife habitat.	No effects.	No effects.	No effects.	Possible damage to vegetation by salt water from upland disposal areas. Destruction of wildlife habitat by construction of upland disposal areas.	No adverse effects. Creation of wildlife habitat.	No adverse effects. Creation of wildlife habitat.	No adverse effects. Aid in shoreline erosion problems. Creation of wildlife habitat.
Air Quality	Insignificant	No effects.	No effects.	No effects.	Possible obnoxious odors from upland disposal areas.	Insignificant	Insignificant	Possible obnoxious odors from shoreline disposal area.
Aesthetics	Displeasing appearance of diked or unvegetated disposal areas in upper and lower Mobile Bay.	No effect.	No effect.	No effect.	Displeasing appearance of diked upland disposal areas and pipelines and booster stations required to transport dredged material.	Displeasing appearance of diked and unvegetated disposal areas in upper bay.	Displeasing appearance of diked and unvegetated disposal areas in upper bay.	Displeasing appearance of diked and unvegetated disposal areas in upper bay and along shoreline disposal area.
Recreation	Possible creation of recreation areas on disposal islands. Loss of small boat recreation area in upper and lower Mobile Bay.	No effect.	No effect.	No effect.	Loss of recreation value of upland disposal areas.	Possible creation of recreation areas on disposal islands. Loss of small boat recreation area in upper Mobile Bay.	Possible creation of recreation areas on disposal islands. Loss of small boat recreation area in upper Mobile Bay.	Possible creation of recreation areas on disposal islands. Initial loss of recreation value of shoreline [illegible]. Loss of small boat recreation area in upper bay.

6.06 Results of the model tests indicated that all plans caused similiar salinity changes regardless of island and fill placement. Generally, the changes under low flow conditions included an increase in salinity in the upper bay and a freshening of the lower bay areas. This finding indicates the changes are related more to the enlarged channel than island construction. None of the plans tested maintained the status quo throughout the bay. However, changes in some localities were considered more significiant in regard to oyster production. The four oyster producing areas in Mobile Bay that were studied included Cedar Point, Whitehouse, Klondike, and South of Theodore Channel. These four areas and model boundaries are shown on Figure 17. Insofar as overall oyster well-being is concerned, the following ranking of importance, in terms of salinity change was used: Cedar Point > White house > Klondike = South of Channel. Table 2 displays salinity data from these critical areas obtained during the testing of each plan. Based upon the salinity results, no single plan proved to be significantly better than the others. The plans that showed the least salinity changes were the Mobile Bay Island and Fill Plans shown on Figures 8 and 10. These were closely followed by the Mobile Bay Island and Fill and Gulf disposal Plan (Figure 16) and the seventh plan tested which represents the Upland Disposal Plan or the Gulf Disposal Plan (Figures 13 and 15).

6.07 The selection of plans for detailed consideration was based upon costs, environmental and socio-economic analyses performed, and input from the public including a meeting of the Mobile Harbor Advisory Committee on 5 August 1976, a plan formulation public meeting held in Mobile, Alabama on 22 November 1976, and various working level meetings of environmental agencies and individuals. Along with the "No Action Plan" structural alternatives taken forward for final comparison included four separate and distinct methods of dredged material disposal. These alternatives are as follows:

(1) The Brookley Expansion Area and Gulf Disposal Plan No. 1 (proposed plan, Figure 1) which encompasses the features described in Section 1 of this document.

(2) Gulf Disposal Plan. This plan would encompass the same channel construction features as the preceding plan, however, it would not include construction of the Brookley Expansion area. All new work and annual maintenance material would be transported to the Gulf of Mexico for disposal.

(3) The Brookley Expansion Area and Gulf Disposal Plan No. 2 (NED plan) which involves all the same elements as the Brookley Expansion Area and Gulf Disposal Plan No. 1 except that maintenance material from the lower bay, south of the intersection of the Theodore Channel, would be disposed in Mobile Bay adjacent the channel in areas currently utilized for maintenance dredged material disposal.

(4) The Channel Widening Plan (least environmental damaging plan) which differs from the preceeding plans primarily in that it considers only channel widening of the main bay channel to reduce delays due to periodic constrained one-way traffic. New work and annual maintenance material would be transported to a gulf disposal area.

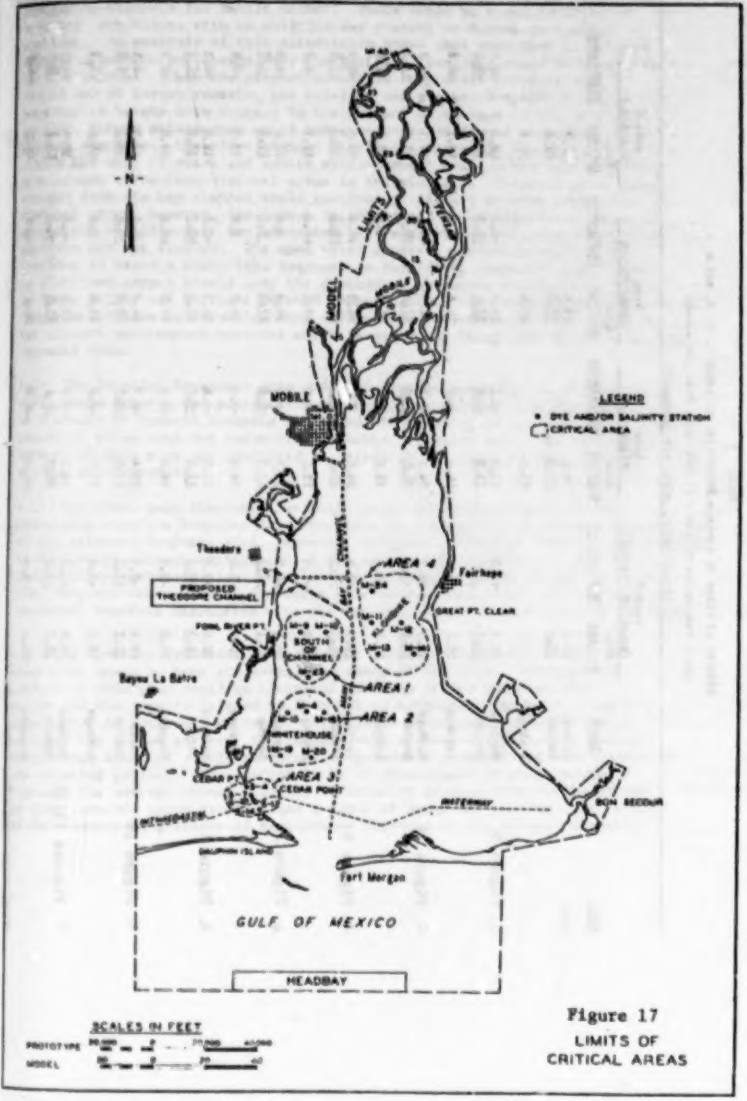

-N-
MODEL LIMITS
MOBILE RIVER
TENSAW
MOBILE
LEGEND
● DYE AND/OR SALINITY STATION
CRITICAL AREA
Theodore
SHIP CHANNEL
BAY
AREA 4
Fairhope
PROPOSED THEODORE CHANNEL
GREAT PT. CLEAR
FOWL RIVER PT.
SOUTH OF CHANNEL
Bayou La Batre
AREA 1
AREA 2
WHITEHOUSE
CEDAR PT.
AREA 3
CEDAR POINT
WATERWAY
INTRACOASTAL
BON SECOUR
DAUPHIN ISLAND
Fort Morgan
GULF OF MEXICO
HEADBAY
SCALES IN FEET
PROTOTYPE 20,000 0 20,000 40,000
MODEL 20 0 20 40

Figure 17
LIMITS OF
CRITICAL AREAS

TABLE 2

Effects of Plans on Average Salinities in Areas 1, 2, 3, and 4

Total Freshwater Inflow - 15,000 Cubic Feet per second

(Total Salts, parts per thousand)

Plan	Depth	Area 1 (South of Channel) Area Average	Area 1 (South of Channel) Difference*	Area 2 (Whitehouse) Area Average	Area 2 (Whitehouse) Difference	Area 3 (Cedar Point) Area Average	Area 3 (Cedar Point) Difference	Area 4 (Klondike) Area Average	Area 4 (Klondike) Difference
Base	Surface	19.8		24.1		25.9		17.7	
	Bottom	23.6		26.5		27.2		22.1	
	Average	21.7		25.3		26.6		19.9	
1, Figure 8	Surface	21.5	+1.7	23.0	-1.1	25.7	-0.2	18.3	+0.6
	Bottom	23.0	-0.6	25.9	-0.6	27.4	+0.2	19.9	-2.2
	Average	22.3	+0.6	24.4	-0.9	26.6	0.0	19.1	-0.8
2, Figure 16	Surface	21.5	+1.7	24.2	+0.1	26.9	+1.0	17.5	-0.2
	Bottom	22.6	-1.0	26.0	-0.5	27.9	+0.7	19.0	-3.1
	Average	22.1	+0.4	25.1	-0.2	27.4	+0.8	18.3	-1.6
3, Figure 9	Surface	19.5	-0.3	24.1	0.0	26.3	+0.4	18.6	+0.9
	Bottom	21.1	-2.5	26.0	-0.5	27.9	+0.7	20.7	-1.4
	Average	20.3	-1.4	25.1	-0.2	27.1	+0.5	19.7	-0.2
4, Figure 10	Surface	20.1	+0.3	23.7	-0.4	25.9	0.0	18.2	+0.5
	Bottom	21.1	-2.5	25.9	-0.6	27.2	0.0	20.4	-1.7
	Average	20.6	-1.1	24.8	-0.5	26.6	0.0	19.3	-0.6
5, Figure 11	Surface	20.5	+0.7	23.3	-0.8	26.5	+0.6	18.0	+0.3
	Bottom	21.3	-2.3	25.6	-0.9	27.9	+0.7	20.0	-2.1
	Average	20.9	-0.8	24.4	-0.9	27.2	+0.6	19.0	-0.9
6, Figure 12	Surface	19.6	-0.2	23.4	-0.7	24.7	-1.2	17.6	-0.1
	Bottom	20.3	-3.3	25.6	-0.9	26.4	-0.8	19.5	-2.6
	Average	19.9	-1.8	24.5	-0.8	25.6	-1.0	18.6	-1.3
7 Figures 13,15	Surface	20.0	+0.2	23.2	-0.9	25.3	-0.6	19.0	+1.3
	Bottom	20.8	-2.8	26.0	-0.5	26.9	-0.3	21.3	-0.8
	Average	20.4	-1.3	24.6	-0.7	26.1	-0.5	20.2	+0.3

* Plan test value minus test value.

.08 The No Action Plan would involve no change in the existing authorized avigation channels for Mobile Harbor. There would be a continuation of xisting conditions with no solution for present or future navigation roblems. An analysis of this alternative shows that more than 17 million ollars a year as an average over the period of analysis would be lost from raffic delays. Since the present trends in deep draft shipping are oward use of larger vessels, the existing and projected problems could be xpected to become more acute. In the absence of changes to the existing roject, future maintenance would continue to be performed according to the urrent practice. The river channel disposal areas would reach capacity ithin the next 18 years and severe environmental constraints retard further evelopment of on-land disposal areas in the vicinity. Disposal of material redged from the bay channel would continue to disrupt benthos within the isposal areas, however, the impact is considered to be relatively minor and ithin the resiliency of the estuarine system provided that existing circulation atterns are not altered. The open water disposal operation would also ontinue to cause a short-term increase in turbidity, temporary reduction dissolved oxygen levels near the discharge, and minor localized increase heavy metals and nutrient related constituents. The Environmental Protection gency would have to establish site designation for offshore disposal of the r channel maintenance material which is presently being placed in an interim pproved site.

.09 The Brookley Expansion Area and Gulf disposal plan No. 1, the proposed lan, would enhance the possibility of economic development in the area a result of lowered shipping costs and the creation of an additional arcel of prime area for industrial or harbor terminal uses. Environmental pacts of this plan are discussed in detail in Section 4 of this EIS and ection D of Appendix 5.

.10 The total gulf disposal plan would avoid the environmental losses sociated with the Brookley Expansion area at the expense of further degradation o the offshore disposal area. However, acceptable offshore disposal areas could designated through application of the section 103 guidlines as would be the se with the proposed plan. More energy would be required to implement this lan than any other channel deepening alternative considered, and the land enncement benefits associated with the Brookley disposal area would be foregone.

1 The Brookley Expansion Area and Gulf Disposal Plan No. 2 is the most onomical means to meet the navigation needs of the area. Environmental pacts of this plan would be identical to those of the proposed plan cept for the impacts related to disposal of maintenance material from the er bay. At intervals of two to three years approximately 12,000 acres lower bay bottom adjacent to the main ship channel would receive dredged intenance material. This technique is presently employed for maintenance of existing project. The 55-foot level of development as proposed would crease the average annual quantity of material dredged from the lower bay about 150,000 cubic yards. Thus a total of about 2.7 million cubic yards maintenance material would be disposed adjacent to the channel annually.

6.12 The most significant concern about disposal of larger quantities of maintenance material in the lower bay would be associated with the physical fate of the material. Evaluation of previous disposal in the bay indicate that for the period of record, 1960 to 1976, approximately 49,600,000 cubic yards of dredged material were disposed in the lower bay including 13,000,000 cubic yards of material from channel modifications. Bathymetric surveys of the disposal areas indicate that there has been a relatively small amount of accumulation of the material. Judging from this information it is expected that the increased quantities of maintenance material would also tend to be redistributed by wind, wave, currents, tidal action, or fisheries activities. As discussed under the "No Action Plan" in Section D of Appendix 5, studies to date indicate that the present practice of disposal of maintenance material adjacent to the channel results in a relatively minor biological impact considered to be well within the resiliency of the estuarine system. It is uncertain how the increased quantities of maintenance material would affect the biological integrity of the bay. Further studies would have to be conducted to implement this alternative. Due to the environmental acceptability of gulf disposal over bay disposal this alternative has been dropped from further study.

6.13 With the Channel Widening Plan, considered to be the least environmentally damaging plan, the main bay channel could be economically justified for a width up to 450 feet. Approximately seven million cubic yards of new work material would be removed to an EPA approved gulf disposal site along with about 4.2 million cubic yards of maintenance material annually. The removal of all new work and maintenance material from the bay to the gulf would have a positive impact to the study area since the plan would aid in retarding the filling of the bay. The resulting losses at the gulf disposal area are not quantified, but the technique of disposal is considered more environmentally acceptable. As discussed in paragraphs 4.36 through 4.41 studies to date indicate that there are suitable sites available for offshore disposal of the material.

6.14 During the public meetings and work level conference held in connection with the survey studies various environmental agencies suggested alternatives to mitigate environmental damages resulting from any plan to modify the Mobile Ship Channel. These alternatives include (1) restore tidal action in Chacaloochee and Polecat Bays, (2) restore circulation in Garrows Bend, (3) establish oyster beds in Bon Secour Bay, (4) improve water circulation in Mobile Bay by creating openings in ridges paralleling the channel from Dog River to Mobile River, (5) fill depressions which exist in Mobile Bay, and (6) establish a recycle plan to remove material from existing Blakely and Pinto Island disposal areas.

6.15 Since any structural alternative would remove shallow water bottom from production, this has been considered an important aspect of any mitigation attempted. Chacaloochee Bay was effectively removed from interaction with

Mobile Bay by construction of the Mobile Delta causeway. Tidal exchange is restricted to four 10x5-foot culverts passing under the highway. In order to provide full tidal flushing, almost the entire causeway across its mouth would require bridging. This may not be desirable for environmental reasons since the bay presently is heavily used by both sportfishermen and duckhunters. However, provisions for a partial restoration of tidal exchange would retard the rate of filling of the bay, provide a degree of control of undesirable aquatic plants, Eurasian milfoil, along the northern boundary of the causeway, and restore much of the nursery value of the lower bay. This measure could be implemented without additional model studies if the differing goals of the freshwater sportsman and the estuarine advocate could be resolved.

6.16 Construction of a causeway connecting McDuffie Island to the mainland has formed a barrier significantly hindering circulation in the Garrowe Bend area. Construction of the Brookley Expansion area may further contribute to the localized circulation problems. Bridging the causeway would provide an opening to enhance river and tidal flushing in the area. This measure could be implemented without further model tests.

6.17 The establishment of oyster beds in Bon Secour Bay is not considered to be a desirable mitigation measure at this time, since the bay has a historical record of very poor spatfall. Thus, it is doubtful that any reefs established would be self-maintaining. However, the circulation changes which would be induced by channel enlargement and deepening could greatly enhance this potential. Additional study would be required as a part of post-authorization studies.

6.18 Efforts to alter existing circulation patterns by opening channels in the upper bay or by filling the depression on the eastern side of the ship channel are viewed with reservation. Such actions have the potential of changing the long-term water quality of the bay in a positive manner. However, on the other hand, a certain amount of oxygen depletion is required if "jubilees" on the eastern shore are to continue. When the impact on larval forms is considered, "jubilees" may not be a bonanza as is commonly thought. Further investigation would be necessary during post-authorization studies.

6.19 A methodology to extend the useful life of the upper bay disposal areas has been developed by the Waterways Experiment Station. Although the plan does not provide for the removal of material to the gulf, it is the first step toward implementation of this technique in latter years. The method consists of a dewatering technique. The Mobile District has already purchased a riverine utility craft which will be used to prevent crust formation and to dewater the areas. Utilizing this technique, the Pinto Island area can be used for the next 18 years. It is presently not economically feasible to haul the material to the gulf for disposal.

6.20 Another alternative is the feasibility of establishing wetland areas as provided under section 150 of PL 94-587. The southern portion of the upper bay disposal area would be suitable for marsh growth and a marsh establishment program would be included with the recommended plan as a mitigation measure for the loss of about 70 acres of marsh along the existing Brookley shoreline. Further investigations for section 150 establishment of wetlands are being conducted as a part of the existing maintenance program for the Mobile Harbor channel.

7.01 Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity. Implementation of the project would enhance the long-term productivity of the area by providing more efficient port facilities for industrial development and by ensuring Mobile's continued importance as a port through the maintenance of desirable regional growth. Construction of the project would enduce additional industrial growth in the vicinity of the Brookley Expansion area. It would result in some land use changing from residential to industrial. This trend can be expected to occur with or without the project and will change the long-term use of the area.

7.02 A decrease in long-term biological productivity in the bay and nearshore area would occur as a result of the commitment of water bottoms occupied by the channels and disposal areas. A long-term increase in biological productivity would occur due to discontinued open water disposal of maintenance material in the bay. Construction of the upper bay expansion area would also provide for the creation of marsh and waterfowl habitat. The overall tradeoffs will be assessed through further studies of the bay and offshore areas.

8.01 Any Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action. Implementation of the project would commit bay and nearshore water bottoms to the enlarged channels and disposal areas. There would be an irretrievable commitment of the aquatic organisms destroyed during construction of the channels and disposal areas. The labor, materials, and energy necessary for construction and maintenance activities would also be irretrievable.

9.01 COORDINATION WITH OTHERS. An initial public meeting for the study was held on 25 April 1967 for the purpose of informing the public about the study and to obtain their views as to desired modifications to the existing project for Mobile Harbor. The meeting was attended by 72 persons representing Federal, State, county, and local government agencies and other civic bodies, navigation interests, industry, and local interests concerned with port development.

9.02 Proponents at the meeting requested that the Federal project for Mobile Harbor be modified to include adoption and construction of the Theodore Channel to provide a channel 40 feet deep and 300 feet wide and that such channel be extended by land cut into a turning basin within the Theodore Industrial Park. Local interests further requested that the turning basin opposite Magazine Point in Mobile River be enlarged and that an anchorage basin of sufficient size to accommodate 12 large ocean-going vessels be provided near the mouth of Mobile River. They also requested that the Corps of Engineers initiate such studies as necessary to determine the engineering and economic feasibility of providing a 50-foot depth in the Mobile Harbor channels. No opposition was expressed to improvement of the harbor, however, the Mobile County Wildlife and Conservation Association requested that all possible steps be taken to minimize adverse effects of dredged material disposal on fish and wildlife.

9.03 Study efforts were directed for the next several years to the authorization and advanced engineering and design studies for the Theodore Ship Channel. Coordination for that study is discussed in the Final Environmental Impact statement for the project which was filed with the Council on Environmental Quality on 10 March 1977.

9.04 Early in 1975, a special committee which became known as the Mobile Harbor Advisory Committee was formed for the purpose of providing access to the planning process for a wide cross-section of the various public in the Mobile Region. Membership on the committee was comprised of individuals from the following interest groups: citizens, business and commerce, local government, environmental interests, state government, port interests, organized labor, and fish and wildlife interests. Several workshop meetings were held with this committee during the major stages in plan formulation. This committee served a vital role to access the public response to alternative plans and to provide a public contact point through key stages in the plan formulation process.

9.05 A second public meeting was held at Mobile, Alabama on 22 November 1976 with over 140 persons in attendance. Alternative plans were presented for the disposal of dredged material, both for the new work and maintenance material which would result from the implementation of any channel improvement. All alternatives considered at this stage of the planning process were related to a 50-foot, deep-draft channel with commensureate widths, anchorage basins, turning areas, and auxiliary barge and access channels. State officials, representatives of shipping interests, and local citizens either spoke or wrote letters in favor of the project. Few of these speakers addressed their comments to the purpose of the meeting which was the discussion of proposed alternatives for deposition of dredged material. The majority of persons either did not address the question altogether or left the selection decision to the Corps of Engineers and directed their remarks to the economic necessity of expediting the project. Those who did address the topic endorsed the Brookley Expansion plan as the most desirable.

9.06 Federal and State agencies, environmental groups, and local citizens spoke or wrote letters expressing concern or opposition, related to the project or certain dredged material disposal alternatives. Concerns included the necessity or desirability of deepening Mobile Ship Channel, the potential environmental degredation of the bay and environs and the possibility of invalidating the Mobile 208 studies being conducted to determine the optimum location of waste discharge points within the bay. The Environmental Protection Agency, although not taking an adverse stand to further development of Mobile Harbor, in general sums up the views of those opposed. This agency prefers that the dredged material be transported to an approved disposal site in the Gulf of Mexico. Also, open water disposal in the bay from both new work and maintenance dredging should be discontinued and spoil island development and navigational channel improvements should be supported by data generated not only from a mathematical model but also from the existing physical bay model.

9.07 In addition to the public meetings and workshops, informal working level meetings were conducted with various environmental agencies and an environmental quality (EQ) committee to identify problems and needs of the area and to develop measures to enhance environmental quality. Most input from the EQ committee involved broad research efforts, beyond the scope of these survey study investigations, to gain a better understanding of the Mobile Bay system. Suggestions from the local scientific community included:

(1) Complete, bay wide, bathymetic survey at a 1,000-foot resolution

(2) More dependable suspended sediment and bed load sediment data inorder to calculate accurately the sediment budget

(3) Flushing time characteristics over the entire range of river discharges

(4) Bay wide circulation characteristics; particularily in need are bottom current measurements

(5) A real attempt to establish a dissolved oxygen budget

(6) Natural and man-made product chemistry systems. Complete budget studies

(7) Virology starting with the very basics

(8) Bacteriology with particular emphasis on dredging activities (resuspension of bacteria and/or nutrients)

(9) The response of marshes to natural and man-made stresses.

(10) Benthic aquatic plant inventory and response to natural and man-made stresses

(11) The entire area of food chains

(12) Commercial and sports aquatic animals; additional information on population dynamics, life histories, growth, mortality, etc.

The envrionmental agencies developed a list of environmental quality objectives which included:

(1) Establish oyster beds in Bon Secour Bay

(2) Improve water circulation in Mobile Bay by creating openings through existing disposal area ridges or remove the ridge completely from Dog River to Mobile River. Construct openings through causeways to improve water circulation. Fill depressions which exist in Mobile Bay.

(3) Test circulation recommendations on model at Vicksburg.

(4) Establish a recycle plan to remove material from the existing Blakely Island and Pinto Pass disposal areas. All of these suggestions have been considered and incorporated into the study where possible.

9.08 After distribution of the Draft Technical Report and Draft EIS, a third public meeting was held at Mobile, Alabama, on 31 July 1979 with 209 persons in attendance. The last phase of planning and study results was summarized at the meeting. The main comments made by the environmental agencies and interests are summarized as follows:

(1) Opposed to further loss of bay bottom by constructing the Brookley Expansion Area.

(2) Disposal in Mobile Bay would increase suspended solids concentrations.

(3) Construction of the Brookley Expansion Area would degrade the aesthetic value of the adjacent University of South Alabama property.

(4) Part of the Brookley Expansion area should be set aside for recreational purposes such as an urban waterfront park.

(5) Construction of the Brookley Expansion area might nullify 208 study results since filling would reduce the assimilative capacity of Mobile Bay.

(6) Larger ships in the bay will cause increased erosion problems.

(7) Recreational useage of Mobile Bay not sufficiently addressed.

(8) Commercial seafood industry not adequately included in b/c ratio.

(9) Mitigation by purchase of lands, i.e., Little Point Clear and Three Rivers.

(10) Need to address offshore port-handling facility with slurry pipeline.

(11) Suggested a trial period for dumping dredged material in Gulf.

(12) EIS should be written by independent third party.

(13) Prefer total Gulf disposal plan.

(14) Additional model studies should be conducted.

(15) Should have mitigation for previous damages to Mobile Bay.

(16) New work material should be used to rebuild Sand Island.

(17) Further, the US Fish and Wildlife Service favored the channel widening and Gulf disposal plan with mitigation included in the authorization. The Environmental Protection Agency expressed concern about the impacts to water quality from channel construction, loss of wetlands and bay bottom, and degradation of air quality from increased industrialization. They suggested that additional model studies be conducted and all new work and maintenance material be disposed in the Gulf of Mexico.

All of these comments were taken into consideration for finalization of the Report and EIS.

9.09 On 20 May 1980 the US Fish and Wildlife Service submitted a report (Appendix 4) in accordance with the Fish and Wildlife Coordination Act of 1958, as amended. Conclusions and recommendations of the report are summarized as follows:

1. Environmental Quality Plan

a. Land should be acquired and managed to maximize fish and wildlife benefits.

b. Areas that have low fish and wildlife potential should be selected for port expansion purposes.

c. Water circulation between Mobile Bay and Delta could be improved by creating openings in the caseways.

d. Water quality within Mobile Bay could be improved by providing better circulation through cuts or removal of spoil levees along the existing navigation channel.

e. Environmentally-sound areas for disposal of dredged material should be designated. This would include deep-gulf sites and non-wetlands of low fish and wildlife value.

2. Recommendations

a. The filling of bay bottoms and wetlands should be deleted from the selected plan.

b. Unless more environmentally-sound disposal areas are identified, dredged material should be taken to approved deep gulf sites.

c. Studies should be conducted to identify environmentally-sound areas for port expansion.

d. An environmental quality plan should be developed in accordance with Principles and Standards.

e. Water quality within Mobile Bay could be improved by providing better circulation through cuts or removal of spoil levees along the existing navigation channel.

9.10 Two of the above requests have not been met through the US Army Corps of Engineers study efforts. The first pertains to the acquisition of lands to maximize fish and wildlife benefits. Since this proposal is not directly related to project impacts or in-kind mitigation, it is considered inappropriate to include it with the recommended plan. The other item, construction of the Brookley Expansion area with loss of bay bottom and wetlands, is a feature of the recommended plan which most environmental agencies and interests oppose. Total gulf disposal is their preferred alternative. It is also the choice of disposal for the Corps EQ plan (least environmentally-damaging plan). However, unlike the environmental agencies and groups, the US Army Corps of Engineers, under Principles and Standards, must take into account economic and other factors including environmental concerns in plan development.

9.11 The draft environmental impact statement, filed with the President's Council on Environmental Quality on 13 July 1979, was mailed to Federal, State, and local agencies and other parties on 2 July 1979. Copies of letters of comment received during coordination of the DEIS and responses are contained in Appendix 3. Responses to the comments are presented on the page facing each letter and responses are keyed to comments by number. Comments on the DEIS generally are the same as those outlined in above paragraphs. One local group, the Mobile Bay Audubon Society, failed to submit comments on the DEIS, but have otherwise expressed their concern over the proposed project through other written correspondence, statements at public meetings, and participation on the EQ committee and technical advisory groups. Their comments are included in above paragraphs and are similar to most environmental concerns expressed in Appendix 3.

BIBLIOGRAPHY

Austin, G.B., Jr. 1954. On the circulation and tidal flushing of Mobile Bay, Alabama. Texas Agr. Mech. Coll., Proj. 24. 28p.

Arnold, E.L., Jr. 1964. Man's alterations of estuaries by dredging and filling a grave threat to marine resources. Ann. Conf. S.E. Assoc. Game and Fish. Comm., Proc. 18:269-273.

Bault, E.I. 1972. Hydrology of Alabama estuarine areas--Cooperative Gulf of Mexico Estuarine Inventory. Ala. Mar. Res. Bull. No. 7. 36p.

Brett, C. Everett. 1975. A study of the effects of maintenance dredging in Mobile Bay, Alabama. Final Contract Report. Mobile District Corps of Engineers. 54pp.

Chapman, Charles. 1968. Channelization and spoiling in Gulf coast and south Atlantic estuaries. In J.D. Newsom (Editor), Proc. Marsh and estuary management symposium, pp. 93-106. T. J. Moran's Sons, Inc., Baton Rouge, La.

Chermock, R.L., P.A. Boone, and R.L. Lipp. 1974. The environment of offshore and estuarine Alabama. Geological Survey of Alabama. Information Series 51. University, Alabama. 135pp.

Colberg, M.R. and D.M. Windham. 1965. The Oyster based economy of Franklin County, Florida. Florida State University, Tallahassee, Florida.

Crance, J. 1971. Description of Alabama estuarine areas--cooperative Gulf of Mexico estuarine inventory. Ala. Mar. Res. Bull., No. 6. pp. 1-85.

Cronin, L., R. Biggs, D. Flemer, H. Pfitzenmeyer, F. Goodwyn, W.Dovel, and D. Ritchie. 1970. Gross Physical and Biological effects of overboard spoil disposal in upper Chesapeake Bay. Nat. Res. Inst., Univ. Maryland, Contrib. No. 397. 66p.

Davis, H.C. 1960. Effects of turbidity producing materials in the sea water on eggs and larvae of the clam (Mercenaria mercenaria). Biol. Bull. 118(1): 48-54.

Davis, H.C., and H. Hidu. 1969. Effects of turbidity producing substances in sea water on eggs and larvae of three genera of bivalve mollusks. Velliger 11(4): 316-323.

David, E.L. 1971. Public perceptions of water quality. Water Resources Res. 7(3): 453-457.

Dovel, W.L. 1970. Project E. Fish eggs and larvae. In L. E. Cronin (Editor), Gross physical and biological spoil disposal in upper Chesapeake Bay, pp. 42-49. Univ. Md., Natur. Resourc. Inst. Spec. Rep. 3.

Flemer, David A. 1970. Project B. Phytoplankton. In L.E. Cronin (Project Leader), Gross physical and biological effects of overboard spoil disposal in upper Chesapeake Bay, pp. 16-25. Univ. Md., Natur. Resourc. Inst., Spec. Rep. 3.

Goodwyn, Frank, Jr. 1970. Project D. Zooplankton. In L. E. Cronin, (Project Leader), Gross physical and biological effects of overboard spoil disposal in upper Chesapeake Bay, pp. 39-41. Univ. Md., Natur. Resourc. Inst., Spec. Rep. 3.

Gulf South Research Institute. 1974. Social, Economic, and Environmental Effect Assessment of Mobile Harbor, Alabama. pp 118-120.

Gunter, G. 1969. Reef shell or mud shell dredging in coastal bays and its effect upon the environment. N. Amer. Wildl. Conf., Trans. 34:51-74.

Hirsch, Nina D., Louis H. DiSalvo, and Richard Peddicord. 1978. Effects of dredging and disposal on aquatic organisms. DMRP, Technical Report D-78-5. 41p.

Huet, M. 1965. Water quality criteria for fish life. In C. Tarzwell (Editor), Biological problems in water pollution, pp. 160-167. U.S. Public Health Serv. Publ. 999-WP-25.

Hutton, R.F., B. Eldred, D.P. Woodburn, and R.M. Ingle. 1956. The ecology of Boca Ciega Bay with special reference to dredging and filling operations, Part I. Florida State Board of Conservation, Tech. Ser. 17.

Ingle, R.M. 1952. Studies on the effect of dredging operations upon fish and shellfish. Tech. Serv., Fla. Bd. Conserv. 5:1-26.

Jones, E.E. 1974. The protozoa of Mobile Bay, Alabama. University of South Alabama. Monograph 1(1), 113 p., 2 charts, 30 plates. University of South Alabama, Mobile, Alabama.

Lackey, J., T. Duncan, J. Fox, J. Markey, J. Sullivan. 1973. A study of the effects of maintenance dredging in Mobile Bay, Alabama, on selected biological parameters. Final Rept., Contract No. DACWOL-73-C-140, Mobile District, Corps of Engineers. 54 p.

Lee, G.F. *et al.* 1978. Evaluation of the elutriate test as a method of predicting contaminant release during open-water disposal of dredged sediments and environmental impact of open-water dredged material disposal. Vol II DMRP Tech. Rpt. D-78-45. U. S. Army Engineer Waterways Experiment Station, Vicksburg, MS., 611 pp.

Livingston, R.J., T.S. Hopkins, J.K. Adams, M.D. Schmitt, and L.M. Welch. 1972. The effects of dredging and eutrophication Mulatto Bayou (Escambia Bay, Pensacola, Florida). Fla. State Univ. Res. No. 111308016, 180 pp.

Manning, J.H. 1957. The Maryland soft-shell clam industry and its effects on tidewater resources. Md. Dept. Resourc. Education, Chesapeake Biol. Lab. Rep. 11, 25 pp.

Markey, Joseph W., 1975. A study on the effects of maintenance dredging on selected ecological parameters in the Gulf Intracoastal Waterway, Apalachicola Bay, Florida, Contract Report Mobile District, Corps of Engineers. 304 p.

Markey, J.W. and H. D. Putnam. 1976. A study of the effects of maintenance dredging on selected biological parameters in the Gulfport Ship-Channel, Gulfport, Mississippi. IN: Proc. ASCE Symposium on Dredging and its Environmental effects. Mobile, AL, 26-28 Jan. 1976. pp 821-832.

Marshall, A.R. 1968. Dredging and filling. pp. 107-113. In J. D. Newsom (ed.), Marsh and Estuary Management Symposium, Proc. T.J. Moran's Sons, Inc., Baton Rouge, Louisiana.

May, Edwin B. 1971. A survey of the oyster and oyster shell resources of Alabama. Ala. Mar. Resource. Bull. 4: Conservation Dept. 53 pp.

May, Edwin B. 1973. Environmental effects of hydraulic dredging in estuaries. Ala. Mar. Resourc. Bull. 9: 1-85.

May, E.B. 1973. Extensive oxygen depletion in Mobile Bay, Alabama. Limnol. and Oceanogr. 18(3) : 353-366.

Nichols, Maynard M., Glen S. Thompson, and Richard W. Faas. 1978. A field study of fluid mud dredged material: its physical nature and dispersal. U. S. Army Waterway Experiment Station. DMRP Tech. Rept. D-78-40. 74 pp.

Oliver, J.S., et al. 1977. Patterns of succession in benthic infaunal communities following dredging and dredged material disposal in Monterey Bay. Tech Rept. D-77-27, U. S. ARmy Engineer Waterways Experiment Station, CE, Vicksburg, MS.

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Parker, R.F. 1973. Additions to "An Environmental study of offshore Alabama as related to drilling for oil and gas." Geological Survey of Alabama, prepared by Ecosystems Management, Fort Worth, Texas.

Ritchie, Douglas E., Jr. 1970. Project F. Fish. In L.E. Cronin (Project Leader), Gross physical and biological effects of overboard spoil disposal in upper Chesapeake Bay, pp. 50-63. Univ. Md., Natur. Resourc. Inst., Spec. Rep. 3.

Ryan, J.J. 1969. A sedimentologic study of Mobile Bay, Alabama. Sedimentological Res. Lab., Fla. State Univ., Contr. 30. 110 p.

St. Amant, L.S. 1972. A discussion of the effects of shell dredging on the ecosystems of northern Gulf of Mexico embayments. Mimeo statement submitted to U.S. Corps of Engineers, U.S. Corps of Engineers, Mobile Dist., Hearing of Sept. 19, 1972.

Sherk, J. Albert, Jr., and L. Eugene Cronin. 1970. The effects of suspended and deposited sediments on estuarine organisms. An annotated bibliography of selected references. Chesapeake Biol. Lab., Ref. No. 70-19, vi+73 pp.

Sherk, J. Albert, Jr. 1971. The effects of suspended and deposited sediments on estuarine organisms. Chesapeake Biol. Lab. Contrib. 443, 73 pp.
1972. Current status of the knowledge of the biological effects of suspended and deposited sediments in Chesapeake Bay. In Andrew J. McErlean, Catherine Kerby, and Marvin L. Wass (Editors), Biota of Chesapeake Bay, pp. S137-S144. Chesapeake Sci. 13, Suppl.

Simon, Joseph L., and John P. Dyer, III. 1972. An evaluation of siltation created by Bay Dredging and Construction Co. during oyster shell dredging operations in Tampa Bay, Florida, Jan. 1, 1972 to March 31, 1972. Final Res. Rep., Dept. Biol, Univ. South Fla., Tampa, Fla., 60 pp.

Stern, Edward M. and William B. Stickle. 1978. Effects of turbidity and suspended material in aquatic environments: Literature Review DMRP Tech. Rept. D-78-21. U. S. Army Engineer Waterways Experiment Stations-Environmental Laboratory, Vicksburg, MS., 118 pp.

Stickney, Robert R. 1972. Effects of intracoastal waterway dredging on ichthyofauna and benthic macroinvertebrates. Ga. Mar. Sci. Center, Univ. System of Ga., Tech. Rep. 72-4.

Stickney, Robert R. 1973. Effect of hydraulic dredging on estuarine animals studied. World Dredging Mar. Construc., July: 34-37.

Swingle, H. 1971. Biology of Alabama Estuarine Areas--Cooperative Gulf of Mexico Estuarine Inventory. Ala. Mar. Res. Bull., No. 5. 123 p.

Swingle, Hugh A., and Donald G. Bland. 1974. A Study of the Fishes of the Coastal Watercourses of Alabama. Ala. Mar. Res. Bull., No. 10. 102 p.

Tanner, W.F., C.E. Brett, J. Ryan, and F. Stapor. (Undated) Mobile Bay estuarine system-case study. In: Case studies of estuarine sedimentation and its relation to pollution of the estuarine environment, Gulf Universities Research Consortium, Houston, Texas. p. C-1 to C-46.

Taylor, J.L. and C. H. Saloman. 1968. Some effects of hydraulic dredging and coastal development in Boca Ciega Bay, Florida. U. S. Fish and Wildl. Service, Fish. Bull. 67(2): 213-241.

U. S. Army Corps of Engineers. 1977. Final Environmental Statement: Theodore Ship Channel and Barge Channel Extension, Mobile Bay, Alabama. 224 pages

Vittor, Barry A. 1974. Effectr of channel dredging on biota of a shallow Alabama estuary. Journal of marine science. Vol 2, No. 3. pp 11-134.

Water and Air Research, Inc. 1975. A study on the effects of maintenance dredging on selected ecological parameters in the Gulf Intracoastal Waterway, Apalachicola Bay, FL. Prepared for U.S. Army Corps of Engineers, Mobile District.

Windom, H. L. 1973. Investigations of changes in heavy metals concentrations resulting from maintenance dredging of Mobile Bay Ship Channel, Mobile Bay, Alabama. Submitted to Mobile District, Corps of Engineers. 46 p.

Wright, Thomas D. 1978. Aquatic Dredged Material Disposal Imports. DMRP Tech. Rept. DS-78-1. WES, Vicksburg, MS 37 pages.

ATTACHMENT 1
ECONOMIC DATA
EXTRACTED FROM US ARMY CORPS OF ENGINEERS
TECHNICAL REPORT (ATTACHMENT 1)
MOBILE HARBOR, ALABAMA
COMPLETE DOCUMENT IS AVAILABLE AT
US ARMY ENGINEER DISTRICT, MOBILE, ALABAMA

FEDERAL FIRST COST

Pipeline dredge upper bay Channel 63,400,000 c.y. @ $1.21/c.y.	$ 76,714,000
Pipeline dredge lower bay Channel 58,653,704 c.y. @ $1.94/c.y.	113,788,000
Hopper dredge entrance Channel 19,018,594 c.y. @ $3.41/c.y.	64,853,000
Mooring Dolphins 16 @ $63,263 ea	1,012,000
Subtotal	256,367,000
Contingencies @ 20%	51,273,000
Subtotal Constructions	$307,621,000
Engineering and Design	9,229,000
Supervision and Administration	9,506,000
Total Construction	$326,375,000
Less Required Contribution by Local Interest	-16,318,000
Aids to Navigation (USGS)	107,000
Mitigation	2,234,000
Total Federal First Cost	$312,398,000

NON-FEDERAL FIRST COST

Dredging Berthing Areas	$ 2,287,000
Dike Construction	5,411,000
Subtotal	$ 7,698,000
Contingencies @ 20%	1,540,000
Cash Contribution	16,318,000
Mitigation	118,000
Total Non-Federal Cost*	25,674,000

*An additional cash contribution from the State of 5 percent of total costs of construction is required in response to the President's water policy message to Congress in June 1978.

PROJECT FIRST COST

Federal	$312,398,000
Non-Federal	25,674,000
Total	338,072,000

CASH CONTRIBUTION

State Contribution of 5% of Total First Cost	16,904,000
Total Federal First Cost	295,494,000
Total Non-Federal First Cost	42,578,000

ANNUAL COSTS

Total Annual Charges (7 3/8% for 50 years)	32,613,000

ANNUAL BENEFITS

Land Enhancement	2,742,000
Navigation	50,061,000
Total Annual Benefits	52,803,000

BENEFIT TO COST RATIO

1.6

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APPENDIX 3

PUBLIC VIEWS AND RESPONSES

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Copies of Draft EIS and Draft Technical Report Sent to:

Senator Howell Heflin
Senator Donald W. Stewart
Congressman Jack Edwards
Governor Forrest James of Alabama
US Army Engineers Waterways Experiment Station
US Environmental Protection Agency
US Department of the Interior
US Department of Commerce
US Department of Energy
US Department of Housing and Urban Development
US Department of Transportation
US Department of Agriculture
US Department of Health, Education, and Welfare
US Food and Drug Administration
Alabama Clearinghouse
Alabama Water Improvement Commission
Alabama Attorney General
South Alabama Regional Planning Commission
Alabama Department of Conservation and Natural Resources
Alabama Coastal Area Board
Mobile County Board of Health
Alabama Conservancy
Alabama Wildlife Federation
Sierra Club
Audubon Society
Auburn University
Mobile City Planning Commission
National Wildlife Federation
Environment Information Center, Inc.
The Condition of American Rivers
Mobile County Wildlife Association
Mobile Public Library
Ecology Center of Louisiana
Baldwin County Wildlife and Conservation Association
Industrial Development Board of the City of Mobile
League of Women Voters
Mobile United
Director of Public Works, City of Mobile
Mobile County Engineer
Alabama State Docks
Mobile Area Chamber of Commerce
Bayou La Batre Area Chamber of Commerce
Environmental Defense Fund
Mobile County Commission
Marine Environmental Sciences Consortium
Mobile Bar Pilots Association
Save Our Bay Club
Mayor, City of Mobile
Alabama State Health Department
Degussa-Alabama, Inc.
Ideal Basic Industries
Kerr-McGee Chemical Corp.
Wallace and Wallace Chemical Oil Corp.
Professor J. E. Bailey
Mrs. Claudine McClintoc
Mr. J. Russell Bailey
Dr. J. H. Blackstone
Mr. Carlyle Blakeney, Jr.
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Mr. Charles R. Butler, Jr.
Mr. Michael L. Crago
Mr. Clifford Danby
Mr. Bailey Dumont
Mr. F. H. Farrar
Mr. Richard Lawrance
Dr. George Folkerts
Mr. H. Paul Friesema
Mrs. Marissa Gardner
Mr. Phil Gnote
Mr. Ted Goodloe
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Mr. Michael Campbell
Mr. C. LeNoir Thompson
Mr. James E. Leemann
Mr. Michael G. Alexander
Mr. James Reeder

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Mr. Cheste A. McConnell
Dr. William E. Workman
Mr. D. Zalimeni
Professor Neal P. Rowell
Lynn E. Dwyer
Mr. Thomas A. Brindley
Mrs. Jeanne Nash
Mr. Wintrop M. Hallett, III
Mr. Mark T. Hill
Mr. Larry Kahaner
Mr. James R. Cooper, Jr.
Mr. Tom Bourland
Mr. Tommy Tyrell
Dr. Will Schroeder
Mr. Mike Druhan
Ms. Verda Horne
Mr. Joe Pearson
Mr. Ben Kilborn
Mr. Dennis A. Moore
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Mr. J. Thomas Sandusky
Ms. Ann Bedsole
Ms. Mary Zoghby
Mr. Gary Cooper
Mr. George Stewart
Mr. Taylor F. Harper
Mr. Michael Figures
Mr. H. L. Callahan
Mr. Bob Glass
Dr. Barry Vittor
Mr. Edward R. Zewen, Jr.
Mr. David Dean

Comments Received From:

US Environmental Protection Agency
US Department of the Interior
US Department of Commerce, National Marine Fisheries Service
US Department of Commerce, Maritime Administration
US Department of Transportation, Federal Aviation Administration
US Department of Transportation, United States Coast Guard
US Department of Agriculture, Soil Conservation Service
US Department of Health Education and Welfare
Alabama Water Improvement Commission
Alabama Office of State Planning and Federal Programs
South Alabama Regional Planning Commission
Geological Survey of Alabama
Alabama Historical Commission
Mobile County Health Department
Industrial Development Board of the City of Mobile
Mobile United
League of Women Voters

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30308

AUG 29 1979

4SA-EIS

Mr. Lawrence R. Green
Corps of Engineers, Mobile District
P. O. Box 2788
Mobile, Alabama 36628

Dear Mr. Green:

1 We have reviewed the Draft Environmental Impact Statement on the Channel Improvements to Mobile Harbor and have some reservations regarding the long-term environmental consequences of the proposed intrabay spoil disposal and subsequent fast land creation. We are concerned for the overall impact on water quality resulting from the deepened ship channel and open water dispersal of spoil. Further, the sacrifice of 1,710 acres of shallow water estuary bottoms in the upper bay for spoil disposal and fast land creation represents an important ecological loss. The peninsula formed by this disposal area may act like a groin to cause a backwater for additional deposition of solids coming down Mobile River.

2 The enlarged ship channel is going to affect certain hydrological and biological aspects of the bay by creating an enlarged and more dynamic salt wedge. Although the model tests conducted at Vicksburg did not represent the exact features of the proposed plan, the results indicated that salt water intrusion would extend further up the Mobile River while increasing the fresh water flow down the Tensaw River. The diversion of the present flow pattern could decrease the assimilative capacity in certain areas of both the river and the bay and lead to increased frequency of water quality standards' violations, causing an increase in the cost of waste water treatment at Mobile to meet these standards.

3 Additional problems would be caused by the change in the overall salinity distribution within Mobile Bay. Model tests indicate an increase in the salinities of the upper bay area with the greatest increases near the channel, decrease in the salinity of Bon Secour Bay and probable increases in the salinity of the lower bay west of the channel. The effect on oyster production in the lower bay cannot be accurately predicted from model studies; however, changes in salinity are known to impact shellfish production.

RESPONSE TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, Page 1

1. Your concerns are recognized and we feel that environmental impacts associated with project modifications, and appropriate mitigation measures, have been adequately addressed in the Report and FEIS to meet the decision-making needs. Items generally mentioned in your first comment are addressed in more detail in response to following specific comments.

We question your supposition that the upper bay disposal area "may act like a groin to cause a backwater for additional deposition of solids coming down Mobile River." The area adjacent to the western side of the main ship channel in the vicinity of Brookley is presently characterized by a dredged material disposal mound which was created in the early 1960's by disposal of new work material from channel modifications. This mound, paralleling the main ship channel, is emergent or nearly so for more than the full length of the proposed Brookley Expansion area. The expansion area dikes would be built generally along the alinement of the existing disposal mound, and thus would not be expected to significantly affect circulation characteristics of the area. Also, the shadowing effect of McDuffie Island, to the north, would tend to lessen the possibility of the expansion area affecting circulation. This conclusion is in agreement with the results of model studies which show the same general changes in salinity for the upper bay with or without the Brookley Expansion area.

2. Model tests show the enlarged channel would allow more of the high salinity gulf waters to travel northward through the bay and, thereby, increase the salt wedge intrusion in the river. This may slightly alter flows in the lower segment of the river and thus could affect the assimilative capacity of the area which presently experiences poor water quality conditions.

It is doubtful that enlarging the channel would lead to an increase in the cost for waste treatment since the Section 208 Water Quality Management Plan for Mobile and Baldwin Counties presently recommends attainment of best practicable treatment levels for industry in the area. However, alteration of flushing in Mobile River would be considered adverse. As expressed in the FEIS, further studies would need to be conducted to determine the degree of impact of the 55-foot deep channel and mechanisms for offsetting adverse effects.

3. All of these points are considered to be adequately addressed in the EIS and, as stated, further model studies would need to be conducted for the 55-foot deep channel.

We do not concur with some statements in the 404(b) evaluation and find other sections not fully addressed.

404(b) Evaluation

4 Page 2, 2. Physical Effects (a)(1). About 10 acres of wetlands habitat exist along the shore of the Brookley Expansion area spoil site while the contiguous shallow water areas are valuable nursery and feeding areas for shrimp, crabs and fish. Since the inception of the Mobile Harbor Project more than 2,000 acres of marsh and shallow water estuarine areas valuable for fish and wildlife habitat have been lost as spoil disposal sites in Polecat Bay and in the Blakely and Pinto Island areas. Approximately 1,280 acres of bay bottoms and 26 acres of marsh have been lost in the construction of the Theodore Industrial Project. Additional marsh and shallow water estuarine areas have been disrupted and degraded in the Dog and Fowl River areas.

The value of these marsh and estuarine areas is well recognized. In addition to providing valuable fish and wildlife habitat, the marsh filters and assimilates nutrients and pollutants, thereby improving water quality. It also produces the detrital material which forms the base of the food chain.

5 Page 4, d. Other Effects (3) Salinity Gradients

We disagree with the statement that "construction of the disposal area would not be expected to significantly affect salinity gradients." The salt wedge will occupy most of the channel and under normal flood tide conditions will cause the fresh water to spread out laterally. Since the west side of the channel would be blocked by the proposed Brookley Spoil Peninsula, and the north dike of the spoil site is oriented to the southeast, most of the fresh water will be directed to the southeast. At the present time most of the fresh water flow goes down the west side of Mobile Bay. More fresh water will also be directed to the southeast between Pinto Island and Little Sand Island because of the restriction in flow caused by the Brookley Peninsula. Model tests indicate an increase in the salinities of the upper bay area, especially near the channel, a decrease in the vicinity of Bon Secour Bay, and probable increases in the salinity of the lower bay west of the channel. The effect on oyster production in the lower bay cannot be accurately predicted from these model studies; however, changes in salinity are known to impact shellfish production. The Final EIS should explain the probable physical and biological consequences of these salinity alterations in greater detail.

6 Page 6, c. Objectives to Be Considered in Discharge Determination

The EPA guidelines state that (1) "discharge activities that significantly disrupt the chemical, physical and biological integrity of the aquatic

e agree that the Draft 404 Evaluation Report and D&IS inadequately
ibed the existing shoreline in the vicinity of the Brookley Expansion
 Further investigations of the manmade land area has revealed that about
res of marsh have voluntarily established along the shoreline. Plant
es mainly include Panicum sp., Phargmites communis (common reed),
cotyle umbellato (pennywort), Iva frutescens (marsh-elder), Myrica
era (wax myrtle), Quercus nigra (water oak), Zizania aquatica (wild
, Spartina patens (salt meadow hay), Silax nigra (black willow), Cladium
cense (saw grass), Baccharis halimifolia (groundsel tree), and Typha
olia (common cattail). A large part of the wetlands area has been
ficantly disturbed by trash dumping and fill activities. Construction of
roposed Brookley Expansion area disposal site would eliminate this wet-
area. The recommended plan provides for a marsh establishment program
 will offset the wetlands loss. The 404 Evaluation Report and EIS have
expanded to discuss the loss of wetlands and mitigation.

esults of model studies indicate that construction of the upper bay
sal area would not be expected to significantly affect salinity gradients
 the same general changes in salinity occurred with or without the
ley Expansion area inplace. Further model studies are needed to assess
fic changes caused by the 55-foot deep channel and determine mechanisms
ffsetting adverse impacts. See response to Comment 1.

s can be seen from the details in the Technical Report and EIS, the
sed plan was chosen through an extensive planning process including
deration of the EPA 404(b) Guidelines and other laws, regulations, and
tive orders which require an account of economic and other factors, as
 as protection of the environment. All of the topics mentioned in your
nt are discussed in the EIS and 404(b) Evaluation Report. These
ents recognize the significance of the project impacts and the
mended plan provides features to offset the adverse impacts.

ecosystem, etc., should be avoided." It should be recognized that the 1,710 acres of shallow water ecosystem which are eliminated by the construction of the Brookley Disposal Site represent a significant disruption of the physical and biological integrity of the acquatic ecosystem of Mobile Bay. Similarly, Section 230.4-1(a)(1) states that from a national perspective, the degradation or destruction of aquatic resources by filling operations in wetlands is considered the most severe environmental impact covered by these guidelines. You should assess the impact of either the specific or cumulative reductions. (2) "avoid dischatge activities that significantly disrupt the food chain including alterations or decrease in diversity of plant and animal species." It is acknowledged in Section 4.44 that changes in salinities will be widespread and affect almost every environmental feature in the bay. Also, eliminating significant portions of shallow bay bottoms will have a detrimental effect on shrimp and fish which constitute the base of the faunal component of the trophic web.

Air quality problems already exist in Mobile County to the point of violating ambient air quality standards. It can be expected that the increase
7 in truck and rail traffic and the secondary expansion which will take place as a result of the project will further degrade air quality unless a concerted effort is made to effect a solution. The Final EIS should detail what efforts will be made to avoid standards' violations.

If this channel deepening project is undertaken, we prefer the Gulf Disposal Plan, i.e., all material deposited in the Gulf. Although this method is not without its own adverse impacts, we believe the Gulf of Mexico has a better capacity for assimilating the huge amounts of materials involved then does Mobile Bay. This contention was expressed in our letters of October 24, 1974, and November 22, 1975, as well as by my statement at the July 31, 1979, Public Meeting. We also believe that additional modeling studies should be conducted to determine the effect of the channel deepening on water quality before the project is initiated. We are especially
8 concerned about potential impacts to shellfish and their harvesting.

We recognize the desire on the part of State and local authorities for optimum development of port facilities, but we also feel that for every benefit to be derived there are environmental costs that must be considered. In this instance, we believe the environmental costs or damages are of sufficient magnitude to warrant offshore disposal. Similarly, maintenance material from the Theodore Industrial Channel should be taken to the Gulf after the Theodore Disposal Island is filled to capacity.

A rating of ER-2 was assigned, i.e., we have environmental reservations
9 to the facility and additional data are required.

Sincerely yours,

John C. White

John C. White
Regional Administrator

RESPONSE TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, Page 3

7. Construction of the project would not be expected to cause any violation in air quality standards. Sufficient regulatory controls are availabe to the Environmental Protection Agency and other State and local agencies to limit air pollution resulting from economic growth in the area.

8. We agree that your position for total gulf disposal is well documented. Total gulf disposal is considered by most environmental agencies to be the preferred alternative for the Mobile Harbor modifications. The EIS has been expanded to better address your position.

As you are aware, the EPA, Washington, has concurred in our selection of potential offshore disposal areas. Next detailed site specific evaluations will be conducted. The EIS has been expanded to include a discussion of the correspondence with EPA and proposed future offshore studies.

As noted in the EIS and response to your comments numbered 2 and 3, further model studies would be needed for the 55-foot deep channel.

The long-term plan for Theodore Ship Channel, presently being constructed, provides for disposal of maintenance material in the bay island disposal area. Further studies would need to be conducted to determine the location for placement of maintenance material after the island is filled to capacity. These studies are not warranted at this time.

9. Additional information has been added where appropriate and the final EIS is considered to be adequate.

United States Department of the Interior

OFFICE OF THE SECRETARY

Southeast Region / Suite 1412 / Atlanta, Ga. 30303
Richard B. Russell Federal Building
75 Spring Street, S. W.

AUG 31 1979

ER-79/615

District Engineer
U.S. Army Corps of Engineers
Post Office Box 2288
Mobile, Alabama 36628

Dear Sir:

We have reviewed the draft environmental statement, technical report and other pertinent papers (combined) for Mobile Harbor, Mobile and Baldwin Counties, Alabama, and offer the following comments.

General Comments

The Fish and Wildlife Service views these documents as inadequate in their consideration and identification of fish and wildlife impacts. Modifications of the existing project, as well as the selected plan, are needed to reduce adverse impacts on fish and wildlife resources within the Mobile Bay area.

1 Dredging and spoiling associated with the construction and maintenance of the Mobile River channel have resulted in extensive fish and wildlife habitat damages in the upper bay and Mobile Delta. Page C-13, Paragraph 24 of the Technical Report states in part, ". . . Since inception of the Mobile Harbor project, 1,287 acres of marsh and bottomlands adjacent to Blakeley and Pinto Islands have been filled. McDuffie Island and Little Sand Island were also formed by deposition of dredged material utilizing an additional 485 acres of marsh and bottomlands." To date, no mitigation has been provided to replace these 1,772 acres of wetland losses. In addition, approximately 3.8 million cubic yards of maintenance spoil material are annually disposed over 20,000 acres of water bottoms adjacent to the bay channel. This method of disposal has altered the natural physical, chemical, and biological conditions of this valuable estuarine system. The Fish and Wildlife Service has often stressed the need for environmentally sound methods of spoil disposal. Deep gulf disposal appears to be a long-term solution to the continuous spoiling problems and is preferred over spoiling in the open bay and other wetland habitats.

RESPONSE TO THE US DEPARTMENT OF THE INTERIOR, Page 1

1. The recommended plan does not include mitigation features for fish and wildlife losses from past modifications and maintenance of the Mobile Ship Channel since the Mobile District Corps of Engineers does not have authority to provide mitigation for the existing project. However, mitigation features have been included for future modifications to the project under the recommended plan. Mitigation for the proposed plan was developed considering in-kind replacement of losses and based upon input from the Fish and Wildlife Service and other environmental agencies at various workshops and meetings and other coordination.

Your recommendation concerning gulf disposal has been taken into consideration. As discussed in the EIS, the recommended plan provides for offshore disposal of a large portion of the new work material and all future maintenance material from the modified channel. The problems with open bay disposal of the large quantities of material would be related more to physical alteration rather than chemical or biological impacts. This has been demonstrated through studies conducted by the Army Waterways Experiment Station and the Mobile District Corps of Engineers. Present disposal of maintenance material in the bay is considered to be well within the resiliency of the estuarine system. This is discussed in more detail in the EIS, filed with the President's Council on Environmental Quality in March 1976, for maintenance of the existing Mobile Harbor Ship Channel.

A resolution by the Public Works Committee of the U.S. House of Representatives adopted June 24, 1975, authorized this study to determine if modifications of the existing project were needed. In accordance with this directive, the Fish and Wildlife Service believes that the project should be modified to provide for adequate measures to mitigate these extensive wetland losses. Recommendations to replace these wetlands will be provided in their forthcoming Fish and Wildlife Coordination Act report.

2 Each of the four proposed alternatives recommends deep gulf disposal as a major method for removing new work and maintenance dredge material. However, the selected plan (Brookley Expansion and Gulf Disposal Plan I (modified)), requires that over 1,700 acres of productive shallow-water bottoms and 10 acres of tidal marshes be filled to provide additional port facilities. These marshes and water bottoms provide vital spawning and nursery habitat for a majority of the fishes that inhabit the Alabama coastal zone.

3 The Service believes that port expansion needs could be satisfied without destroying valuable fish and wildlife habitat. Several hundred acres of diked spoil areas are located on Blakeley, Pinto, and McDuffie Islands. These spoil sites are currently projected to be filled to capacity by the time proposed project modifications are scheduled for construction. Further studies should be conducted to determine the feasibility of using these and other areas for port expansion in lieu of filling shallow-bay waters and tidal marshes. The Theodore Industrial Park should also be utilized for additonal port requirements.

4 Furthermore, we do not believe that the filling of 1,700 acres of shallow-water bottoms and 10 acres of tidal marsh can comply with Presidential Executive Order 11990 (Protection of Wetlands) when other less damaging alternatives are feasible.

5 An Environmental Quality (EQ) Plan, as required by Principles and Standards, was not developed for this project. The "Channel Widening" alternative was initially identified as the EQ Plan as described on page D-31 of the Technical Report. However, this alternative was later identified as the "least environmentally damaging plan" as described on page D-69 of the report. Since an EQ Plan was not developed, trade-offs between EQ and National Economic Development (NED) objectives as outlined under Principles and Standards were not conducted in development of the selected alternative.

2. The EIS has been expanded to better address the wetlands located within the proposed Brookley Expansion area. See response to EPA Comment Number 4. The impacts associated with loss of wetlands and bay bottom are recognized and considered to be adequately discussed in the FEIS.

3. A discussion of alternative port expansion plans has been added to Appendix 5, Section D, of the Corps Report and Section 6 of the EIS. Alternative locations mentioned in your comment have been addressed; however, the Brookley Expansion Area remains the recommended plan to meet port expansion needs.

4. Executive Order 11990 pertains to the protection of wetlands. Field surveys indicate that about 70 acres of marsh exist within the proposed Brookley disposal area. These wetlands have voluntarily established along the fringe of a manmade fill area. It is assumed that a well designed wetlands establishment plan for the proposed project would adequately mitigate the wetlands loss. Executive Order 11990 states that each agency shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action include all practical measures to minimize harm to wetlands. In making this finding, the head of the agency may take into account economic, environmental, and other pertinent factors. We feel that the planning efforts discussed in the feasibility report and EIS demonstrate compliance with Executive Order 11990.

5. According to Corps of Engineers regulations, an EQ plan must make a net positive contribution to the EQ account when compared to the without project condition. When this cannot be accomplished, the "least environmentally damaging" plan must be identified as was the case with the Mobile Harbor study. The inconsistencies in terminology in the Technical Report (Appendix 5) have been corrected to reflect that a least environmentally damaging plan was identified. This is considered to be in accordance with Corps of Engineers regulations and the objectives of Principles and Standards.

Specific Comments

Technical Report

Page B-44

6 Only two small cultural surveys have been conducted. Due to the high potential for cultural resources in the Bay area and the magnitude of potential impact, we agree with the need for a survey (see Appendix 1, page 35). The survey should be made in consultation with the Alabama State Historic Preservation Officer and the results included in the final environmental statement.

Page B-61, Paragraph 88

7 Only a few of the grasses that are found in the upper bay are mentioned. In his paper regarding submerged grassbed communities in Mobile Bay, Borom indicates that eleven species of submerged aquatic vegetation are dominant in Mobile Bay. Those found in the upper bay include tape grass (Vallisneria americana), redhead grass (Potamogeton perfoliatus), coontail (Ceratophyllum demersum), water stargrass (Heteranthera dubia), horned pondweed (Zannichellia palustris), bushy pondweed (Najas guadalupensis) Eurasian watermilfoil (Myriophyllum spicatum), elodea (Egeria sp.), and muskgrass (Nitella spp.). These species of aquatic vegetation should also be included in this discussion.

Page C-6, Paragraph 10

8 A proposed spoil disposal site located on Pinto Island consists of approximately 180 acres of fresh marsh and 17 acres of water bottoms. This paragraph should, therefore, explain that all disposal sites are not uplands and that these wetlands and water bottoms on Pinto Island are proposed to be filled.

Page D-112, Paragraph 200

9 This paragraph should explain how and where marshes and waterfowl habitat will be created. It should also discuss the criteria used to determine the amount of marsh acreage that would be created.

Environmental Impact Statement

Appendix 1

Page 9, Paragraph 2.14

10 It is stated that the bulk of the salt marsh of the bay is associated with Deer, Fowl, and Dog Rivers. However, according to Stout in his paper regarding marshes of the Mobile Bay Estuary, true salt marshes, dominated by Spartina alterniflora and Juncus roemerianus, occur only

6. Agree, an archeological survey would be required for the proposed channel cut and disposal area. This is discussed in the EIS. However, the surveys could be conducted during post authorization studies.

7. The paragraph has been expanded to include the additional species of aquatic vegetation.

8. The paragraph has been rewritten to indicate that wetlands will be destroyed when Pinto Pass is utilized for disposal of maintenance material from the existing River Channel.

9., See response to your Comment Number 1. The Technical Report and EIS have been expanded to better address the loss of wetlands and appropriate mitigation features. The proposed plan provides in-kind mitigation for the loss of approximately 70 acres of wetlands along the Brookley shoreline. The mitigation plan would provide for the establishment of approximately 70 acres of marsh on the southern end of the Brookley Expansion area.

10. Agree, appropriate clarification has been added to the paragraph.

in lower Mobile Bay near Main Pass. The marshes of Little Dauphin Island, the east end of Dauphin Island, Fort Morgan Peninsula, and Oyster Bay have borders of Spartina alterniflora with the higher interiors covered with stands of Juncus roemerianus. The remainder of the marsh areas within the bay are brackish in nature and include such species as Spartina cynosuroides, Spartina patens, Cladium jamaicense Sagittarie falcata, Scirpus validus, Zizania aquatica, Zizaniopsis miliaceae, and Phragmites communis. The specific locations of salt marsh should be identified and discussed in this paragraph.

Page 10, Paragraph 2.17

11 The commercial landing values are based on 1974 figures and should be updated to the most recent values provided by the National Marine Fisheries Service.

Page 22, Paragraph 4.29

12 The degree of impact of increased turbidities on fishes is greatly influenced by the season of the year. During peak spawning periods, adult fishes may be able to avoid the increased turbidities; however, eggs, larvae, fry and juvenile fishes could be severely affected. Therefore, the seasonal impacts of turbidities on finfishes and shellfishes should be discussed.

Page 33, Paragraph 4.44

13 The impacts of increased salinities west of the ship channel on oyster production should be addressed.

Page 35, Paragraph 4.48

14 Evaluations of significance for the National Register should be made in accordance with the National Historic Preservation Act of 1966, as amended (Public Law 89-665), rather than the Archeological and Historic Preservation Act of 1974 (Public Law 93-291). The further requirements of 36 CFR Park 800 should then be followed, as necessary.

Page 35, Paragraph 4.49

15 Action, if any, that has been taken by the Corps of Engineers to assure this project will not adversely impact endangered or threatened species should be discussed.

1. Updated landings statistics have been added to the EIS and Technical eport.

2. Seasonal impacts are discussed in paragraph 4.30. Also, the impacts of redging upon eggs and larve, as well as other developmental stages, are iscussed in paragraph 4.29.

3. Initial model tests, discussed in Section 6 of the EIS, were with a low reshwater inflow of 15,500 cubic feet per second (cfs). As shown in Table 2, or tests most nearly representing the proposed plan, Figure 16, cedar point ad Klondike areas would be considered approaching the threshold of impact cedar point + 0.8 °/oo / klondike - 1.6 °/oo). Section 4 of the EIS has een expanded to better illustrate the changes occurring with mean freshwater nflow of 63,500 cfs. The changes occurring at mean flow would not be onsidered as critical as low flow changes. Further model tests would have to e conducted for the proposed plan during post authorization studies to etermine the effects of the 55-foot deep channel and required mechanisms for ffsetting significant adverse hydraulic effects of the enlarged channel. his will include further coordination with the environmental agencies.

4. Agree, the paragraph has been appropriately rewritten.

5. Proper contact has been made with the Fish and Wildlife Service implementing coordination procedures in accordance with the Endangered Species Act f 1973. By letter of 14 October 1980 (included in the pertinent correspondence section of this appendix), the Fish and Wildlife Service, Jackson, ississippi, indicates that "although several Federally listed species may ccur within the project area, they would not be affected by the proposed ctivity." The EIS has been expanded to include this discussion.

Summary

16 The Fish and Wildlife Service views the selected alternative (Brookley Expansion and Gulf Disposal Plan 1 (modified)) as being extremely detrimental to fish and wildlife resources. Primary concerns include no consideration of alternative port expansion sites that could prevent destroying 1,700 acres of shallow-water bottoms and 10 acres of tidal marshes, the lack of an EQ Plan, and no proposed mitigation as a modification feature for past project damages. Unless the project is modified to satisfy these deficiencies, severe damages will occur to fish and wildlife resources within the Mobile Bay area.

In view of this potential damage, the Fish and Wildlife Service recommends that any plan involving the deposition of dredged material in Mobile Bay be dropped from further consideration in project planning. The Service also recommends that unless more environmentally sound disposal methods are identified, all future dredged material should be taken to approved deep Gulf sites. An EQ Plan, as required by the Water Resource Council's Principles and Standards, should be developed for future planning purposes.

The Fish and Wildlife Service is presently preparing a Fish and Wildlife Coordination Act report that will outline specific modifications to reduce adverse fish and wildlife impacts of the existing and proposed Mobile Harbor project.

We appreciate the opportunity to review and comment on this draft environmental impact statement and technical report.

Sincerely yours,

James H. Lee

Regional Environmental Officer

16. Your specific comments which are summarized here have been responded to in previous paragraphs. A copy of your Fish and Wildlife Coordination Act Report will be forwarded through channels with the Technical Report and EIS.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Duval Building
9450 Koger Boulevard
St. Petersburg, Fl 33702

August 17, 1979 FSE61RJH

TO: Richard Lehman, EC

FROM: William H. Stevenson, FSE

SUBJECT: Comments on the Draft Environmental Impact Statement-Technical Report on Mobile Harbor, Alabama (DEIS #7907.01)(COE)

The draft environmental impact statement for Technical Report on Mobile Harbor, Alabama that accompanied your memorandum of July 5, 1979, has been received by the National Marine Fisheries Service for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General Comments

We have serious reservations regarding the Brookley Expansion Plan (BEP) and channel enlargement. The BEP would result in the direct filling of 1710 acres of upper Mobile Bay bottoms which constitute approximately 5% of the bay's bottom less than 6 feet deep. Moreover, 700 acres of bay bottom and 520 acres of nearshore bottom would be committed to channel enlargement, and 1300 acres of bay bottom may be subject to extensive mud flow.

As stated in the DEIS and 404(b) evaluation, the upper part of Mobile Bay remains productive even though it is subject to more stress than other areas of the bay. The proposed loss combined with previous unmitigated losses would substantially reduce fishery productivity of the area. Previous comments on maintenance dredging of the harbor identified our concern with the losses and requested a mitigation plan be developed[1].

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[1] June 27, 1979. Regional Office letter to Col Charlie Blalock, Mobile District COE, concerning FP79-MH01-10 dated May 16, 1979.

RESPONSE TO THE NATIONAL MARINE FISHERIES SERVICE, Page 1

1. Your 27 June 1979 letter was commenting on the Corps of Engineers Public Notice for continued maintenance dredging of the Mobile Harbor project. As you are aware, the Mobile District Corps of Engineers do not have the authority to provide mitigation for the existing project. Continuing investigations concerning the upper harbor maintenance will require further coordination with the environmental agencies and other interests. Resolution of that issue is beyond the scope of this EIS.

Mitigation measures have been included for future modifications to the project under the recommended plan. The EIS has been expanded to more clearly address the mitigation features.

2 Although impacts resulting from channel enlargement are less severe than the BEP, if the channel can be justified without the Brookley Expansion area, certain mitigation can be incorporated to offset the impacts.

We support deep gulf disposal of all future maintenance and new material.

Specific Comments

3 Page B-10, paragraph 12 through page B-28, paragraph 27, Port Development. We believe that considerable development can occur on Blakeley, Pinto, and McDuffie Islands. Accompanied with total use of Theodore Industrial Park it seems possible to reduce the size, or eliminate the need for the BEP.

4 Page C-6, paragraph 10, Disposal of Dredged Material. We are pleased with the statement that the current practice for disposal of dredged maintenance material from Mobile River is to use diked upland disposal areas. Accordingly, we conclude that the 110 acres of intertidal wetlands and 17 acres of shallow-water habitat at Pinto Pass will be excluded from disposal plans advertised under Public Notice FP79-MH01-10 dated May 16, 1979.

5 Pages C-12 and C-13, Physical Alterations of Mobile Bay. The direct removal of 1772 acres of tidal wetlands and contiguous shallows, the open water disposal related to channel constructio and maintenance, and the presence of the channels and saltwater intrusion have impacted Mobile Bay. This damage has occurred without mitigation or enhancement of estuarine resources. Port development should be compatible with these resources and mitigation should be performed to offset the damages caused by earlier Federal projects. If unalterable, to minimize losses, future projects should also be fully mitigated.

6 Page D-15, paragraphs 15 and 16. The formulation of an overall EQ plan should contain all mitigation measures listed in paragraph 16 and Appendix 1, paragraph 6.13. While the draft technical report discusses EQ plans, it apparently fails to identify one that has been accepted. We are available to assist you in its development.

7 Page D-96, paragraph 165. In addition to the 1710 acres directl filled for the Brookley expansion plan, 1300 acres of bay bottom may also be impacted by mud flow. Many of these losses would be avoidable by Gulf disposal of dredged material and use of existing upland areas.

RESPONSE TO THE NATIONAL MARINE FISHERIES SERVICE, Page 2

2. As stated in the EIS, further studies would need to be conducted for the enlarged channel. This will include further coordination with the environmental agencies and other interests. We acknowledge your support of total gulf disposal.

3. See response to the Department of the Interior Comment Number 3.

4. Your conclusion is incorrect since the current practice for disposal of maintenance material from the River Channel is to use diked upland areas known as the North and South Blakely Island sites. However, future plans do require the use of Pinto Pass for disposal and the paragraph has been accordingly clarified.

5. See response to your Comment Number 1.

6. All of the listed items will be carried into the post authorization studies. The EIS has been expanded to clarify this point. A review of your project files should reveal that suggestions made by the National Marine Fisheries Service and other environmental agencies were included in developing the mitigation features and EQ plan. We will continue to keep your agency informed during further studies for the project.

7. Total gulf disposal would avoid the environmental losses associated with the Brookley Expansion area at the expense of further degradation to the offshore disposal area. As indicated in the Technical Report, there are no suitable upland areas available for disposal of the large quantities of dredged material. Also, as documented in the report, many factors, including economics and the environment, were considered in arriving at the recommended plan. However, we recognize your position and it is herewith documented.

8 Page D-112, paragraph 200. The discussion of establishing marshes and waterfowl habitat should be addressed in the EQ and mitigation plan.

9 Page E-21, paragraph 28. We concur that the Gulf disposal alternative would create less adverse environmental impacts than continued open-water disposal in the bay.

10 Page E-23, paragraph 33. Mitigation should be incorporated into an overall EQ plan that will offset the previous permanent damage as well as proposed permanent damage. Permanent damage can occur to areas other than fill areas. For example, a channel subject to regular use and maintenance dredging will not achieve and maintain previous productivity levels. We further believe this damage should be mitigated.

Appendix 1 - DEIS

11 Pages 14-37, paragraphs 4.01-4.57. Whereas we generally agree with the assessment of the proposed action on the environment, the rationale of justifying the selected plan based upon the future impacts being less than the present impacts should be fully substantiated. Agencies such as NMFS, FWS, and EPA have been requesting Gulf disposal for years. Benefits resulting from Gulf disposal alone should justify its use for maintenance dredging. Although efforts are being made to cease open bay disposal, this does not necessarily justify the permanent elimination of 1710 acres of bay bottom.

Section 6.01

12 Page 39. We recommend a full investigation of the potential to completely use available upland habitat for alternative port development. Upland sites such as Blakeley, Pinto, and McDuffie Islands can be used to handle many shipping needs.

13 Page 57, paragraph 7.02. This paragraph should expand its mitigation plan to include other measures to enhance long-term productivity, i.e., improving Bay circulation, filling old dredged holes, etc. (see Appendix 1, para. 6.13). Also, a long-term increase in biological productivity for the Bay could occur from Gulf disposal without a decrease in productivity resulting from the BEP. The statement is not clear on this issue.

Appendix 2 - Section 404(b) Evaluation

14 Page 2, paragraph 2a(1). It is our understanding an estimated 10 acres of fringe wetlands covered under the 404(b) wetland definition exist along the shoreline proposed to be filled.

15 Page 7, paragraph 6d(2) and (3). These paragraphs should include impacts to larval, post larval, and juvenile fishes

8. The Report and EIS have been expanded to more fully discuss the wetland establishment plan.

9. The statement was made assuming that continued disposal would be associated with project modifications and the ensuing larger quantities of dredged material. As noted in the EIS for the existing project and the EIS for the proposed modifications, studies to date indicate that the present practice of disposal of maintenance material adjacent to the channel results in a relatively minor biological impact considered to be well within the resiliency of the estuarine system. The most significant concern with the larger quantities of material from project modifications would be the possibility of buildup and physical fate of the material. For this reason, and due to environmental agency acceptability, continued open bay disposal of maintenance material was not included in the recommended plan. However, one purpose of the Mississippi Sound Study is to further investigate continued open water disposal of maintenance material in lower Mobile Bay since there is presently no significant buildup of material in that area.

10. See response to your Comments 1 and 6 in regard to mitigation.

11. The suggested rational was not used to justify the recommended plan. See response to your Comment 9 for the rational in selecting the Gulf disposal plan. However, selection of the proposed plan would ultimately result in discontinuance of open water disposal of maintenance material from the ship channel into the bay. This is considered beneficial to the estuarine ecosystem at the expense of degradation to the offshore environment. However, through application of the Section 103 Guidelines, an environmentally acceptable offshore site could be selected.

12. See response to the Department of the Interior's Comment Number 3.

13. See response to your comments numbered 6 and 11.

14. See response to the Environmental Protection Agency Comment Number 4.

15. The paragraph has been expanded to include those discussions in paragraphs 4.29 - 4.31 of the EIS.

and invertebrates. Impacts to be addressed under this section do not necessarily mean adults are only considered by 404(b).

16 Page 8, paragraph 6d(10). If existing upland areas are incorporated into the Master Plan, then fast land creation could be substantially decreased if not eliminated.

17 Page 9, paragraph 9(a). We cannot concur with the statement that alternatives to the proposed discharge are impracticable and would have a greater adverse impact on the aquatic and semi-aquatic ecosystem. We suggest alternatives as discussed in the above comments should be considered.

18 Page 9, paragraph 9(b). We feel the elimination of 1710 acres of bay bottom which constitutes 5% of all bottom in the bay less than 6 feet is an unacceptable impact on the Mobile Bay estuary.

CLEARANCE: SIGNATURE AND DATE:

F7:KRRoberts AUG 23 1979

16. See the response to your Comment Number 7.

17. Your position is recognized and responses have been provided for your specific comments.

18. Your position is recognized and has been taken into consideration.

UNITED STATES DEPARTMENT OF COM
Maritime Administration
Central Region Office
No. 2 Canal Street
New Orleans, La. 70130

July 30, 1979

Mr. Paul E. Hemmann
Secretarial Representative
Office of the Secretary
U. S. Department of Commerce
Federal Region IV
1365 Peachtree St.
Suite 300
Atlanta, GA 30309

Dear Mr. Hemmann:

After review of the Technical Report concerning the proposed dredging of a deeper channel in Mobile Bay, the Maritime Administration approves and endorses the project as proposed in Plan 1 (modified). This proposes a 55-foot channel with dredge material utilized to enlarge the Brookley facility for future port expansion. The balance of the material is to be disposed of in the offshore area designated.

In addition to providing the required economic benefits to the Port of Mobile, it also appears to have minimal detrimental effect on the environment of the Bay.

A deeper channel depth is necessary at this time in view of the anticipated completion of the Tombigbee Waterway. Cargo tonnage generated by the waterway will require larger ocean ships presently restricted by the channel depth.

Sincerely,

G T Bornkessel

G. T. BORNKESSEL
Region Port Development
Officer

RESPONSE TO THE US DEPARTMENT OF COMMERCE, MARITIME ADMINISTRATION

The comments are acknowledged, no response is necessary.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SOUTHERN REGION
P. O. BOX 20636
ATLANTA, GEORGIA 30320

July 6, 1979

Mr. Lawrence R. Green
Chief, Planning Division
Mobile District Corps of Engineers
Post Office Box 2288
Mobile, Alabama 36628

Re: Draft Technical Report and Environmental Statement for Channel Improvements to Mobile Harbor, Alabama

Dear Mr. Green:

This will acknowledge your letter of July 2, 1979, advising that the Mobile District Corps of Engineers is studying a proposal to make channel improvements to Mobile Harbor, Alabama.

We have reviewed the project with respect to potential environmental impact for which this agency has expertise. Our review indicates there will be no significant adverse effects to the existing or planned air transportation system as a result of this project.

Thank you for the opportunity to review and comment on this proposal.

Sincerely,

Benny C. Frazier

BENNY C. FRAZIER
Chief, Planning and Appraisal Staff

RESPONSE TO THE FEDERAL AVIATION ADMINISTRATION

The comment is acknowledged. No response is necessary.

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

ADDRESS REPLY TO:
COMMANDER (dpl)
EIGHTH COAST GUARD DISTRICT
HALE BOGGS FEDERAL BLDG.
500 CAMP ST.
NEW ORLEANS, LA. 70130
(504)589-2961
(FTS)682-2961

16475
08 AUG 1979

District Engineer
Mobile District, Corps of Engineers
P.O. Box 2288
Mobile, AL 36628

Re: Draft Technical Report on
Mobile Harbor, June 1979

Dear Sir:

Coast Guard District and Captain of the Port of Mobile staffs have reviewed the subject report. The Coast Guard has no comments or objections to your proposed port development plan.

The Captain of the Port of Mobile and the District Aids to Navigation Branch are prepared to assist you in any way in the implementation of this harbor development plan.

Sincerely,

P.L. Collom

P.L. COLLOM
Commander, U.S. Coast Guard
District Planning Officer
By direction of the Commander,
Eighth Coast Guard District

Copy: Captain of the Port of Mobile
U.S. Coast Guard Group Mobile
Commander, Eighth Coast Guard District (oan)
Commandant (G-WEP-7)

RESPONSE TO UNITED STATES COAST GUARD

The comments are acknowledged, no response is necessary.

United States Department of Agriculture
Soil Conservation Service
P. O. Box 311
Auburn, Alabama
36830

July 24, 1979

Mr. Lawrence R. Green
Chief, Planning Division
Mobile District, Corps of Engineers
Department of the Army
P. O. Box 2288
Mobile, Alabama 36628

Dear Mr. Green:

We have reviewed the Draft Technical Report for Channel Improvements to Mobile Harbor, Alabama, as requested, but have no comments or suggestions to offer. As always, we appreciate having an opportunity to review documents of this sort.

Sincerely,

W B Lingle
W. B. Lingle
State Conservationist

RESPONSE TO THE US DEPARTMENT OF AGRICULTURE

The negative reply is acknowledged, no response is necessary.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION IV
101 MARIETTA TOWER , Suite 1503
ATLANTA, GEORGIA 30323

OFFICE OF THE
Principal Regional Official

September 11, 1979

HEW-943-9-79

Colonel Charles L. Blalock
District Engineer
U. S. Army Engineer District, Mobile
Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Subject: Draft Technical Report and Draft Environmental Impact Statement, Channel Enlargement for Navigation, Mobile Harbor, Alabama

Dear Colonel Blalock:

We have reviewed the subject Technical Report and Draft Environmental Statement. Based upon the data contained in the draft, this Department's concerns have been adequately addressed except for the impact on the University of South Alabama Brookley Center.

The University of South Alabama Brookley Center has been developed on a 293.41 acre portion of Brookley AFB conveyed by the Department's Federal Property Assistance Program, Public Law 81-152. Under the terms and conditions of the Department's conveyance instrument the University's title to the property could be jeopardized if the approved program of educational utilization does not continue. The University pays the Federal Government for the property by an earned credit for each year of educational utilization.

Additional information should be included in the Final Environmental Impact Statement to indicate what extent the proposed action will impact upon the campus and mitigation measures to prevent any adverse effects upon the educational programs being conducted.

We appreciate the opportunity to review the DEIS and would like to receive a copy of the Final Environmental Impact Statement.

Sincerely yours,

James E. Yarbrough

James E. Yarbrough
Regional Environmental Officer

RESPONSE TO THE DEPARTMENT OF HEALTH EDUCATION AND WELFARE

The proposed Brookley Expansion area would not be expected to have any adverse effects upon the University of South Alabama educational program. Land use immediately adjacent to the proposed fill area includes a small paved road and a golf course. The proposed fill area may be aesthetically displeasing to people at these locations.

STATE OF ALABAMA

WATER IMPROVEMENT COMMISSION

Ira L. Myers, M.D.
Chairman, State Health Officer
Richard A. Forster
Vice Chairman
Commissioner, Department of
Conservation and Natural Resources

Perry Hill Office Park
3815 Interstate Court
Montgomery, Alabama

James W. Warr
Director

Commission Members:
Dr. [illegible], Mobile
Charles D. Coggin, Hueytown
[illegible]
James A. Brassell, Jr.

Mailing address:
State Office Building
Montgomery, AL 36130

Telephone 205/277-3630

August 30, 1979

Mr. Lawrence R. Green
Chief, Planning Division
Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Mr. Green:

This office is in receipt and has completed its review of the Draft Environmental Impact Statement and accompanying materials concerning channel improvements for Mobile Harbor, Alabama. It is our understanding that in view of overall evaluation, design criteria, and planning objectives, it is the Corps' opinion that alternative Brockley Expansion Area and Gulf Disposal Plan No. 1 (modified) is considered the best plan for solving existing problems, as defined by the Corps, and meeting the needs of the study area. Based on our review, we would like to submit the following comments.

1 The alternative as discussed in the DEIS calls for the filling of approximately 1,710 acres of upper Mobile Bay bottom. Problems associated with physical alterations to the Bay, as cited in the Draft Technical Report, support the contention that the creation of this fast land would undoubtedly result in water quality degradation and poor water circulation. An example of the effects of such physical alterations to the Bay are illustrated by the problems associated with the Garrow's bend area resulting from the construction of the connective causeway to McDuffie Island. Construction of, and modifications to, the Mobile Ship Channel itself have resulted in the reduction of normal circulation in the upper bay and has contributed to dissolved oxygen deficits in the Bay's bottom waters. Disposal of dredged material for the creation of fast land off Brockley would also result in increased turbidity and suspended solids which according to the DEIS could last for a period of

RESPONSE TO THE STATE OF ALABAMA WATER IMPROVEMENT COMMISSION, Page 1

1. Construction of the Brookley Expansion area could worsen the poor flushing conditions in the Garrows Bend area. In order to improve circulation in the area, the recommended plan includes consideration of constructing an opening in the causeway which connects McDuffie Island to the mainland. Also, the configuration of the north end of the disposal area would be such that it would allow maximum flushing in the Garrows Bend area.

Impacts of maintenance of the existing channel are addressed in an EIS prepared by the Mobile District Corps of Engineers and filed with the President's Council on Environmental Quality in March 1976. Discussions related to bay circulation and dissolved oxygen depletion are contained in that EIS and have been referenced and appropriately summarized in this EIS.

Transfer type facilities, such as grain, container, and general cargo handling, would be expected to establish on the Brookley Expansion area. These commodities are not generally associated with critical spills and pollution problems. Adequate legislative controls are available to the regulatory agencies for the control of point and nonpoint sources of pollution.

several years and impact up to approximately 1,300 acres of water bottoms west of the ship channel off Brookley in addition to the 1,710 acres of Bay bottom which would be claimed by disposal, for a total of over 3,000 acres. In addition, if Brookley were expanded the potential for increased pollution to Mobile Bay via spills, and additional point and non-point source discharges, would be greater.

In addition to the creation of the Brookley expansion area, it
is our understanding that the plan as proposed provides for the
deepening and widening of the entrance channel and the main Bay
channel, an anchorage area near the upper limits of the main Bay
channel, and the construction of a turning basin opposite McDuffie
Island. From the information submitted, it appears that these
improvements may be warranted based on the arguments presented;
but, as stated in the DEIS, we are in agreement with the Corps
2 that further studies need to be conducted utilizing additional
physical and mathematical models to more accurately determine
the effects of deepening and widening channels on dissolved oxygen
concentrations, overall circulation patterns, salinity, turbidity,
and suspended solids. Of particular concern are the unanswered
questions involving possible increased turbidities along the
eastern shore, possible alteration of the flushing characteristic
of Mobile Bay, possible increased frequency of closure of shellfish
harvesting of Bon Secour Bay, and a decrease in the waste assimilative capacity within the Mobile River.

It is noted that under the Brookley Expansion Area and Gulf Disposal
Plan No. 1 (modified), new work material from the lower Bay and
entrance channels would be transported with dump scows to the
Gulf of Mexico for deep water disposal. While this office is in
agreement with gulf disposal of dredged material, it is our opinion
that before a site is chosen, as a minimum, studies should be
conducted to analyze those factors as enumerated in Appendix 1,
3 page 24 of the DEIS. In addition to these, it is felt that
sufficient data for the determination of long-range effects of
disposal on bottoms should be collected; hydrodynamics, to
include water circulation, sediment transport and long-term fate
of dredged materials should be studied, and biological surveys of
bottoms addressing location of prime harvest areas, migratory
routes, spawning and nursery areas should be made. After
careful consideration of accumulated data, the most appropriate
gulf disposal site could then be determined.

2. Further model studies would be conducted as a part of post authorization studies. Data collected from construction of the Theodore Ship Channel project will be utilized to update the physical model.

3. The Environmental Protection Agency is responsible for designation of an offshore disposal area. As discussed in the EIS, site designation would be accomplished in accordance with the 11 January 1977 Ocean Dumping Criteria developed pursuant to the Marine Protection, Research, and Sanctuaries Act of 1972, PL 92-534. The guidelines require that sufficient studies be conducted to determine an environmentally acceptable disposal area. The EPA has concurred in our selection of potential offshore disposal areas. Detailed site specific evaluations would be conducted during post authorization studies. We are maintaining coordination with the EPA relative to the site designation requirements and procedures are being established for further disposal site evaluations.

4 Based on the materials submitted and on the above discussion, it is the opinion of this office that the Gulf Disposal Plan alternative as discussed in the June 1979, Draft Technical Report is the most appropriate choice. This plan allows for the study and possible implementation of the proposed channel modifications, provides for long-term increased biological productivity and water quality in the Bay due to the discontinued practice of open water disposal of maintenance material in the Bay, and is consistent with the scope and planning objectives of the on-going dredged material disposal study concerning the Mississippi Sound and adjacent areas.

Should you have any questions on this or related matters, please do not hesitate to contact Mr. Robert W. Cooner of this office.

Sincerely,

James W. Warr
Director
Water Improvement Commission

JWW-RWC/gdo

cc: Mr. Tod Gail, AWIC
Mobile Office

RESPONSE TO THE STATE OF ALABAMA WATER IMPROVEMENT COMMISSION, Page 3

4. The comment is acknowledged. No response is necessary.

STATE
OF
ALABAMA

OFFICE OF STATE PLANNING
AND FEDERAL PROGRAMS

FOB JAMES
GOVERNOR

BOBBY A. DAVIS
DIRECTOR

3734 ATLANTA HIGHWAY
MONTGOMERY, ALABAMA 36130
(205) 832-6963/6964

October 1, 1979

TO:
Mr. Lawrence R. Green
Chief, Planning Division
Department of the Army
Mobile District, Corps of Engineers
Post Office Box 2288
Mobile, Alabama 36628

Michael R. Amos

FROM:
Michael R. Amos, Administrator
State Clearinghouse
State Planning Division

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT

Applicant: Mobile Corps of Engineers

Project: Draft Environmental Impact Statement for a Technical Report on Mobile Harbor

State Clearinghouse Control Number: OSP-020-79

The Draft Environmental Impact Statement for the above project has been reviewed by the appropriate State agencies in accordance with Office of Management and Budget Circular A-95, Revised.

The comments received from the reviewing agencies are attached.

Please contact us if we may be of further assistance. Correspondence regarding this proposal should refer to the assigned Clearinghouse Number.

A-95/05
Attachments
Agencies contacted for comment.
- South Alabama Regional Planning Commission
- Historical Commission
- Geological Survey of Alabama
- State Planning - Stevenson

REQUEST FOR REVIEW OF PROJECT NOTIFICATION

TO: Mr. Richard D. Pruitt
South Ala Reg Plng Commission

CH Number: CEP-020-79

Applicant: Mobile Corps of Engineers

Program: Draft Environmental Impact Statement for a Technical Report on Mobile Harbor

DATE: July 25, 1979

Return Prior to: ASAP
Date

Please review the attached Environmental Impact Statement and indicate your comment with respect to any environmental impact involved.

Comments: (Please check one block.)

No comment (Environmental Impact Statement is in order and no additional comments are offered.)

Comments (Elaborate below.)

Comment here:

Signature

Please Return Original to:

Office of State Planning
and Federal Programs
3734 Atlanta Highway
Montgomery, Alabama. 36130

FORM CH-2a
8/71

SOUTH ALABAMA
REGIONAL PLANNING COMMISSION

INTERNATIONAL TRADE CENTER
250 N. WATER STREET

MAILING ADDRESS
P. O. BOX [illegible]
MOBILE, ALABAMA [illegible]

MAIN OFFICE (205) 433-6541
AREA AGENCY ON AGING
(205) 432-7417

RICHARD D. PRUITT
EXECUTIVE DIRECTOR

NORMAN J. WALTON, CHAIRMAN
[illegible], GENERAL VICE-CHAIRMAN
J. C. DAVIS, JR., PROJECT REVIEW VICE-CHAIRMAN
W. H. [illegible], SECRETARY
[illegible], TREASURER

September 25, 1979

Mr. Lawrence R. Green
Chief, Planning Division
Department of the Army
Mobile District Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Re: Technical Report on Mobile Harbor, Draft

Dear Mr. Green:

In accordance with the Office of Management and Budget Circular, A-95, revised, the South Alabama Regional Planning Commission, Regional Clearinghouse, has reviewed the above referenced application. This review indicated that the proposed application is consistent with current areawide plans, programs, and objectives. Accordingly, the Commission concurs with the application and recommends that it be approved.

If we can be of further assistance to you concerning this or other programs that your agency sponsors, please advise.

Sincerely,

Don Pruitt

Don Pruitt
Executive Director

RDP:js

cc: Mike Amos, Office of State Planning and Federal Programs
SARPC File No. 79-199-1

REQUEST FOR REVIEW OF PROJECT NOTIFICATION

TO: Mr. Tom Joiner
Geological Survey of Alabama

CH Number: OSP-020-79

Applicant: Mobile Corps of Engineers

Program: Draft Environmental Impact Statement for a Technical Report on Mobile Harbor

DATE: July 25, 1979

Return Prior to: ASAP
Date

Please review the attached Environmental Impact Statement and indicate your comment with respect to any environmental impact involved.

Comments: (Please check one block.)

No comment (Environmental Impact Statement is in order and no additional comments are offered.)

X Comments (Elaborate below.)

E
AUG
1979
Alabama D
State C

Comment here:

The only obvious long-term effect on the water resources of this area from this proposed project would be the increased salt wedge intrusion of the Mobile River. The Corps of Engineers is aware of this effect and suggests in the proposal that additional modeling tests are needed to determine the full ramifications of such a change. We concur completely in this approach.

Thomas J. Joiner
Signature
Thomas J. Joiner, State Geologist

Please Return Original to:

Office of State Planning
and Federal Programs
3734 Atlanta Highway
Montgomery, Alabama 36130

FORM CH-2a
8/71

REQUEST FOR REVIEW OF PROJECT NOTIFICATION

TO: Dr. A. Russell Mortensen
Historical Commission

CH Number: OSP-020-79

Applicant: Mobile Corps of Engineers

Program: Draft Environmental Impact Statement for a Technical Report on Mobile Harbor

DATE: July 26, 1979

Return Prior to: ASAP
Date

Please review the attached Environmental Impact Statement and indicate your comment with respect to any environmental impact involved.

Comments: (Please check one block.)

No comment (Environmental Impact Statement is in order and no additional comments are offered.)

Comments (Elaborate below.)

Comment here:

The Alabama Historical Commission has reviewed the above referenced Draft Environmental Impact Statement and finds that it inadequately addresses the protection of cultural resources. The Draft should include plans for a full scale magnetometer survey of Mobile Harbor followed by an underwater investigation of potentially significant ayonilier recorded. The Draft should also include plans for a cultural resource assessment of all land disturbance activities associated with improvements to Mobile Harbor

RECEIVED
21 1979

Signature

Please Return Original to:

Office of State Planning
and Federal Programs
3734 Atlanta Highway
Montgomery, Alabama 36130

FORM CH-2a
8/71

RESPONSE TO ALABAMA OFFICE OF STATE PLANNING AND FEDERAL PROGRAMS

The specific agency comments are acknowledged. No response is necessary except for comments made by the Alabama Historical Commission. We agree that further cultural resources surveys are necessary. However, there will be sufficient time to conduct the surveys during post authorization studies. These efforts will be fully coordinated with the Alabama Historical Commission.

Mobile County Health Department

P. O. BOX 2867 MOBILE, ALABAMA 36601 (205) 690-8158

Alfred R. Stumpe, M.D., M.P.H.
Health Officer

L. Oswald Lightsey, M.P.H.
Assistant Health Officer

BOARD OF HEALTH
Henry C. Mostellar, Jr., M.D., Chairman
Daniel F. Sullivan, M.D.
David M. Mullins, M.D.
Sidney J. Gray, Jr., M.D.
Robert S. Hartin, M.D.
Roy Hess, Pres., County Commission

August 21, 1979

Department of the Army
Mobile District, Corps of Engineers
Attn: SAMPD-EE
P. O. Box 2288
Mobile, AL 36628

Gentlemen:

Reference is made to your letter dated July 2, 1979, requesting comments on the Draft Environmental Impact Statement (DEIS), concerning channel improvements for Mobile Harbor, Alabama. Our recommendations for changes have been incorporated in a rewrite of the affected parts of the report, and are enclosed.

If you have any questions regarding these comments, please contact Mr. Danny Herrin at (205) 690-8112.

Sincerely,

Alfred R. Stumpe, M.D., M.P.H.
Health Officer

ARS/peg

Attachment

Comments on Draft Environmental Impact Statement (DEIS)

Page B-81 - AIR QUALITY.

114. Remains unchanged.

115. An extensive air quality monitoring program has been conducted since 1972 by the Mobile County Health Department, Division of Air Pollution Control. A network of 9 ambient monitoring stations contributing data to the program, operates in Mobile County. Emphasis of the program has been placed primarily on suspended particulate matter, sulfur dioxide and photochemical oxidants values since these have been recognized as the primary concern for Mobile County in attainment and maintenance of Federal ambient air quality standards. Mobile County is an Air Quality Maintenance Area for particulates.

116. Annual trends for area-wide total suspended particulate levels in suburban, urban and composite categories are illustrated in Figure B-17 for the interval 1972 through 1977. Values for urban stations correspond to those in the immediate Mobile area; the remaining stations are designated suburban. This data shows that particulate levels for Mobile County have declined significantly since 1972. Some urban stations exceeded the primary ambient air quality standard, therefore, a section of downtown Mobile is designated as not meeting the primary standard for total suspended particulates. Sulfur dioxide was monitored continuously through 1977 at an urban and suburban station. For both stations, levels were lower than the secondary national ambient air quality standard.

117. Data was obtained for photochemical oxidants at two suburban stations during 1978. It was found that the 1-hour oxidant standard of 160 ug/m^3 was exceeded 134 times. Mobile County is currently listed as not meeting the primary national ambient air quality standards for photochemical oxidants.

Page D-87 - Air Pollution.

146. Remains unchanged.

Page 11 - Appendix 1.

2.20 Air Quality. Air pollution exists in Mobile County to the point of violating ambient air quality standards for photochemical oxidants and particulates. The entire county of Mobile is a non-attainment area for photochemical oxidants, that is ozone, and one sub-county area is non-attainment for total suspended particulates. The "downtown area" of Mobile violates the primary total suspended particulates standard. Photochemical oxidants are the product of a complex series of chemical reactions involving oxides of nitrogen, hydrocarbons, and sunlight. A significant portion of the photochemical oxidants within Mobile County are transported from other areas by wind. Within Mobile County, the main source of hydrocarbons is automobile exhaust and petroleum handling operations; the main source of oxides of nitrogen are automobile exhaust and other combustion sources. Additional coverage of air quality can be found in paragraphs 114 through 117 within Section B of the Survey Report.

Page 36 - Appendix 1.

4.56 Remains unchanged. This is a duplication of page D-87, paragraph 146, Air Pollution.

RESPONSE TO THE MOBILE COUNTY HEALTH DEPARTMENT

The Technical Report and EIS have been rewritten to incorporate your recommended changes.

INDUSTRIAL DEVELOPMENT BOARD OF THE CITY OF MOBILE
MOBILE, ALABAMA

REPLY TO:
P. O. BOX 2187

July 31, 1979

U. S. Army Engineer
District, Mobile
Attn: Environment and
Resources Branch
Post Office Box 2288
Mobile, Alabama 36628

Re: Draft Environmental Impact Statement
(DEIS) and Draft Technical Report
Concerning Channel Improvements for
Mobile Harbor Alabama

Dear Sir:

We have reviewed the referenced materials furnished by you regarding the improvement of the Mobile Harbor which has been under study for some twelve years. This Board has long been interested in the economic and industrial development of the Mobile area. It is a land owner in Mobile County and is greatly concerned with the enrichment of quality of life for the people of Mobile.

A review of the Draft Technical Report and the DEIS substantiate to us the fact that while there will be primary and secondary impacts on the environment which may be unwanted, these impacts would be more than offset by the direct transportation savings which would occur through the increased use of larger, more economical vessels and land enhancement which would develop from the creation of fast lands adjacent to the Mobile Area Industrial Complex.

It would seem that this detailed technical report would clearly justify the adoption of a plan which would provide for the Brookley Expansion Area and for Gulf Disposal. The question of whether to adopt Plan No. 1 as modified or Plan No. 2 would seem to devolve into the relative value of having fast land of approximately 1,700 acres as opposed to fast land of approximately 1,000 acres at Brookley. This Board suggests that the additional land will prove to be of value and should be developed as part of this Harbor Improvement Project.

RESPONSE TO THE INDUSTRIAL DEVELOPMENT BOARD OF THE CITY OF MOBILE

The comments are acknowledged. No response is necessary.

The environmental concerns expressed in the DEIS must, and should, be clearly and adequately addressed, but must be addressed in the context of the best interest of all parties.

The Corps of Engineers is to be commended for developing a comprehensive, competent study of this complex question.

Sincerely,

THE INDUSTRIAL DEVELOPMENT BOARD
OF THE CITY OF MOBILE, ALABAMA

E. Frank Schmidt

E. FRANK SCHMIDT
President

RESPONSE TO INDUSTRIAL DEVELOPMENT BOARD OF THE CITY OF MOBILE

The comments are acknowledged. No further response is necessary.

STATE
OF
ALABAMA

OFFICE OF STATE PLANNING
AND FEDERAL PROGRAMS

FOB JAMES
GOVERNOR
BOBBY A. DAVIS
DIRECTOR

3734 ATLANTA HIGHWAY
MONTGOMERY, ALABAMA 36130
(205) [illegible]

August 22, 1979

Colonel Robert H. Ryan
District Engineer
Mobile District
Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Colonel Ryan:

This Office has completed its review of the recently submitted Corps of Engineers report "Technical Report on Mobile Harbour, Alabama." We find the report to be comprehensive in the evaluation of the alternatives identified and considered. This Office concurs in and supports the selected plan identified in the study. In order for the Port of Mobile to remain a viable outlet for export and import to world markets the modifications suggested by this report are necessary.

We recommend the selected plan be forwarded for further action and consideration. This Office also suggests continued coordination and cooperation with the Alabama State Docks Department.

If we can be of further assistance in this very important matter, please let us know.

Sincerely,

Bobby A. Davis
Director

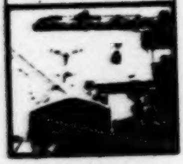
BAD/ws:b

RESPONSE TO ALABAMA OFFICE OF STATE PLANNING AND FEDERAL PROGRAMS

The comments are acknowledged, no response is necessary.

MOBILE UNITED

GENERAL CHAIRMAN
[illegible]
EXECUTIVE DIRECTOR
[illegible]
VICE CHAIRMEN
[illegible]
TREASURER
[illegible]
PAST GENERAL CHAIRMAN
[illegible]
STEERING COMMITTEE
[illegible]



*Committee Chairman
†Committee Co-Chairman

October 5, 1979

Colonel Robert H. Ryan
District Engineer
U. S. Army
Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Colonel Ryan:

I have enclosed a report supporting in general the improvements to the Mobile Harbor as outlined in your Environmental Impact Statement.

This was unanimously passed by the Mobile United at its general membership meeting held October 2, 1979.

We are looking forward to your active participation as a member of Mobile United.

Sincerely,

R. J. PEARSON, JR.
Executive Director

Enclosure

RJPjr/nsp

RESPONSE TO MOBILE UNITED

The support of Mobile United is acknowledged. Responses to specific comments are contained on following pages.

STATEMENT
BY
SUB-COMMITTEE OF THE JOINT ECONOMIC DEVELOPMENT/ NATURAL RESOURCES COMMITTEES
OF
MOBILE UNITED

concerning the Technical Report
on
Mobile Harbor Alabama

by
U.S. Army Corps of Engineers
dated
July 2, 1979

This report is a statement reflecting, as accurately as possible, the opinions of those attending meetings of the Joint Economic/ Natural Resources Committee and its Sub-committee. At these meetings the merits of the four plans presented by the Corps were discussed.

This statement is divided into three parts as follows:

1. Those items on which there is full agreement
2. Those items on which there is conditional agreement
3. Those items on which there is not substantial agreement.

Item 1. Those items on which there is full agreement

All parties agree that the following elements of the four plans presented should be carried out and perhaps expedited.

a. widening of the entrance channel

b. widening of the main ship channel

c. provide a turning basin in the McDuffie Island Area

d. provide an anchorage for ships in the upper bay

RESPONSE TO STATEMENT BY MOBILE UNITED, Page 1

1. All of the listed features are included in the recommended plan. Recommended early action items include channel widening in the upper bay, a turning and anchorage area at the head of the bay, and a passing lane in the central area of the bay.

Item 2. Those items on which there is conditional agreement

(a) disposal of new spoil and maintenance spoil to the Gulf

2 There appears to be strong reason to suppose that disposal of new and maintenance spoil to the Gulf in future projects is the method of choice. It is highly unlikely that open water (Bay) disposal of new or maintenence spoil will find any or very little support. The single exception to this is the Brookley Plan for new spoil which is discussed more fully in section 3. The above initial statement, however, is completely conditional on the necessary biological testing of the Gulf disposal sites for adverse effects. Short term effects ie. one or two years to full recovery would not be objectionable, but permanent adverse effects on the biological populations would not be acceptable. It is recommended that a test or tests on this disposal method be initiated in timely fashion to decide best locations and prevent adverse effects before final decisions on the overall project become necessary.

(b) Deepening of the Channels to 55'

There is general agreement that deepening of the channels should be undertaken when this becomes necessary to protect our competitive position in world trade, and to move bulk cargoes basic to the economic development of Alabama, such as coal, iron, and oil. This statement, however, is conditional on

3 1. dredge spoil is deposited in an environmentally sound location in the offshore Gulf of Mexico.

4 2. Coastal resources of the Bay including oyster reefs will be monitored before, during, and after completion of the project,

2. See response to EPA Comment Number 8 and Alabama Water Improvement Commissions Comment Number 3.

3. See response to your Comment Number 2.

4. Post authorization studies will be conducted to more specifically delineate possible impacts of the modified channel for the purpose of developing plans which will include features for protection of the oyster reefs and other natural resources of the bay. Further coordination with the environmental agencies and other interests will be necessary in order to accomplish this goal.

and the Corps will ensure that the present levels of coastal resources and plants and animals are maintained in the Bay.

5 3. The Corps will use sand from the entrance channel to restore eroded beaches on Dauphin Island and Fort Morgan peninsulas.

4. Ridges along the upper bay ship channel will be removed and the material will be used for erosion protection along the western shore of Mobile Bay, as well as to fill depressions in Mobile Bay that cause stratification of bay waters and oxygen depletion.

5. Additional oyster beds will be established in Bon Secour Bay 6 and other areas of the bay.

6. Openings in the causeway can be created to improve the circulation in the bay north of U.S. Highway 90 by restoring tidal action to Chacaloochee and Polecat Bays, and thereby minimizing the effect of the salt wedge on circulation patterns in the bay. It is recommended that tests with the Mobile Bay Model be used to guide decisions on ways to minimize the salt wedge effects of deepening the channel to 55'.

Item 3. Those items on which there is not substantial agreement

The items are (a) Japanese Industry Subsidy
(b) Brookley Plan

(a) Japanese Industry

There is a minority opinion that shipments of coal to Japan are not in the short or long-term national interest, as it amounts to making coal supplies cheaper to Japan and uses up non-renewable fossil fuels that America may well need in the future. This is a very large question of national policy that most participants feel

5. The Corps of Engineers current maintenance practice allows for disposal of the sandy bar channel material for beach nourishment when equipment is available. This would continue to be the policy for future maintenance of the channel. The use of new work material from the entrance channel for beach nourishment will be further investigated during post authorization studies.

6. All of your recommendations will be carried forward into post authorization studies.

should be addressed in the Natural Energy Policy which Congress has so-far, failed to formulate. In effect we would be preempting Congress in this question if we take a position at this time.

(b) Brookley Plan

This plan involves the use of new spoil to build dikes for eventually creating 1700 acres of new land for expansion of the State docks. All are agreed that provision for expansion of the State Docks is essential but opinions differ on how this is to be accomplished. Some would use the land in the present Brookley Industrial Park in place of creating new land. This would, in their opinion, leave the unfilled area for a possible barge assemblay area when this becomes necessary.

The other side of this discussion maintains that there is no feasible alternate plan to the one proposed to fill in at Brookley. 7 Because of the wide discrepancy in views here, it is suggested that Mobile United press for further study of alternates to the present Brookley plan and also press for initiation of study and action so as to be prepared properly for the completion of the Tenn-Tom project including State Docks expansion and coordination of State, City and County planning in support of the State Docks expansion.

If further complete study of this question results in the Brookley Plan as being the only feasible alternate plan then Mobile United would support the Corps in the Brookley Plan for the docks expansion.

RESPONSE TO STATEMENT BY MOBILE UNITED, Page 4

7. See response to the Department of the Interior's Comment Number 3.

LEAGUE OF WOMEN VOTERS
OF BALDWIN COUNTY
BOX [illegible]
FAIRHOPE, ALABAMA [illegible]

August 29, 1979

U.S. Army Engineer Distr., Mobile
Corps of Engineers
Mobile, Alabama

Subject: Draft, Mobile Harbor, June 1979

Dear Sirs:

The Baldwin County League of Women Voters has worked for many years in the area of water quality, specifically the enhancement of water quality in Mobile Bay.

1 While many studies have been conducted by the U.S. Engineers, 208 Water Quality Program, E.P.A. and others over a number of years, Mobile Bay is still a stressed body of water. Any harbor expansion and channel enlargement should be conducted in such a manner that the Bay will not be further stressed. There are areas in the Bay that do not meet the water classification standards and further, the prospects do not look encouraging that they ever will if we continue to employ such practices as open water disposal.

This Technical report lacks basic research information upon which to base a decision as to the best choice of plan for harbor improvements and channel widening. More information is needed regarding flushing action, various man made chemistry systems, sediment loads with respect to submerged aquatic vegetation.

2 Before any further irreversible alterations a re made to Mobile Bay, integrated studies should be done to provide a predictive capacity to determine the bearing load of pollutants and silt in rela tion to the effec ts on the ecosystem, on organisms and on human health. More research is needed in the area of Virology and Bacteriology with respect to resuspended dredge material and other pollutants.

Very truly yours,

Marie Herman

Marie Herman, President
Baldwin Co. LWV

RESPONSE TO LEAGUE OF WOMEN VOTERS OF BALDWIN COUNTY

1. Open water disposal under the recommended plan would not be expected to result in violation of State water quality standards.

2. We believe the environmental studies referenced and discussed in the EIS, and the proposed post authorization studies are sufficient for project purposes. Your other referenced studies would be beyond the scope of the EIS.

OTHER PERTINENT CORRESPONDENCE

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
200 EAST PASCAGOULA STREET, SUITE 300
JACKSON, MISSISSIPPI 39201

October 14, 1980

Colonel Robert H. Ryan
District Engineer
Mobile District, Corps of Engineers
P.O. Box 2288
Mobile, Alabama 36628

Dear Colonel Ryan:

This is in response to a letter dated October 1, 1980, from your office requesting a list of endangered, threatened, or proposed species that may occur in the area of the Mobile Harbor Ship Channel Project (Log no. 4-3-81-008).

Although several Federally listed species may occur within the project area, they would not be affected by this proposed activity.

Please advise if we can provide additional assistance.

Sincerely,

Gary L. Hickman
Area Manager

cc: RD, FWS, Atlanta, Georgia (ARD-FA/SE)
ES, FWS, Bay St. Louis, Mississippi
Department of Conservation and Natural
Resources, Montgomery, Alabama

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA [illegible]

MAR 11 1980

REF: 4E-FA

Colonel Robert H. Ryan
District Engineer
U. S. Army, Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Colonel Ryan:

In your letter dated October 4, 1979, you requested a statement of concurrence on the availability of a Gulf of Mexico dredge disposal site within reasonable distance to Mobile Bay. It is our understanding that the 16-mile limit shown on drawing D-14 of your draft report represents the proposed disposal area.

As you are aware, the information you submitted concerning this disposal site was furnished to our Washington office for review and on January 7, 1980, we met in your offices to discuss their findings. From this meeting and memorandum dated January 25 from T. A. Wastler, Chief, Marine Protection Branch, EPA, Washington, we are able to concur in the selection of this proposed site for further study.

The supplemental information prepared by TerEco Corporation for the Mobile District is adequate for site evaluation purposes and disposal area recommendation. This recommended disposal area should next be investigated in detail on a site specific basis. The inclusion of the site environmental assessment data to be gathered during this site specific investigation in the post authorization phase EIS supplemental will enable EPA to meets its voluntary EIS requirements for final site designation.

A copy of the above mentioned memorandum is attached for your information and use.

Sincerely yours,

Rebecca Hanmer

Rebecca W. Hanmer
Regional Administrator

Enclosure

cc: T. A. Wastler
Marine Protection Branch

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MEMORANDUM

SUBJECT: Mobile Harbor Project - Disposal Site Designation

FROM: T. A. Wastler, Chief
Marine Protection Branch (WH-546)

TO: Howard D. Zeller, Deputy Director
Enforcement Division, Region IV

This office has reviewed the Draft Environmental Impact Statement (DEIS) and supplemental environmental data on the subject proposed project and provide herewith our comments on the disposal site information. As we agreed at the meeting in Mobile, these comments may be incorporated into your overall comments on the DEIS.

The supplemental information prepared by TerEco Corporation for the Mobile District is very adequate for site evaluation purposes and disposal area recommendations. These recommended disposal areas should next be site specifically investigated in detail according to guidelines contained in Section 228.13 of the January 11, 1977 Ocean Dumping Regulations and Criteria supplemented by the forthcoming Guideline for baseline Surveys of Dredged Material Ocean Disposal Sites to be published by the Corps Waterways Experiment Station. These surveys will provide sufficient environmental assessment on the disposal site that this office will be able to designate the site in the FEDERAL REGISTER in accordance with Section 228.4.

The conduct of these baselines surveys during the Pre Authorization and Post Authorization phase of the project would be in the timeframe that we could designate the site prior to the construction phase when dredging and disposal would commence. Performance of these baseline surveys during these phases, and inclusion of the site environmental assessment data in the Post Authorization Phase EIS Supplemental would enable us to meet our voluntary EIS requirements for site designation and also be in line with the Council of Environmental Quality's (CEQ's) EIS guidelines.

As we have in the past, we will maintain contact with the District personnel and be available to them for advice or consultation on any disposal site matters.

ALABAMA STATE DOCKS DEPARTMENT
MOBILE

P.O. Box 1588
MOBILE, AL 36601

Robert M. Hope
Director

May 17, 1979

Col. Charlie L. Blalock
District Engineer
U. S. Army Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Col. Blalock:

This letter is in response to recent discussions with your staff regarding the Corps' study of modifications to the existing Federal navigation project for Mobile River.

We understand that the benefits that may be achieved from improvement of Mobile Harbor will occur primarily from the bulk movements of coal, ores and grains. We further understand that the present capacities and planned locations for future State-related public terminals will have a significant bearing upon the extent of benefits realized. In this respect, I would like to take this opportunity to relate to you the present status of the State's bulk facilities and the established long-range plans for the provision of additional facilities as they are required.

The Alabama State Docks' present coal exporting terminal was constructed on State property near the mouth of Mobile River on the southern portion of McDuffie Island in 1975. This facility was constructed with an initial throughput capacity of about 4.8 million tons annually and is presently being expanded to handle about 10.2 million tons annually. Future development plans provide for triple the original capacity. The McDuffie terminal is a modern facility located below the harbor's tunnel and bridge restrictions and has been planned with sufficient expansion area to fully meet all foreseeable coal export needs through the Port of Mobile.

The Alabama State Docks' existing public ore handling facility is located at the junction of Three Mile Creek and Mobile River. This facility was initially constructed in 1927. Through the years the facility has been renovated and modernized and

Appendix 3
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presently has a practical annual throughput capacity of from 5 to 6 million tons. The facility is presently operating very close to this capacity. The Mobile River tunnels effectively limit navigable water depths to this terminal to the present 40 feet. This constraint along with limited access and storage seriously limits the potential for any significant additional expansions of this terminal's capability. In view of these constraints the State Docks' development plan has identified a site on the north end of McDuffie Island for the construction of an additional ore terminal. Construction of such a terminal is presently included in the State's Phase 1 near term development program. The State has recently acquired 143 acres of additional adjoining property at a cost of $11,000,000 to assure adequate storages, expansion and backup space for this new facility.

The State's public grain facility is located on Mobile River above the existing tunnels. This facility is presently being modernized and expanded. Upon completion of the ongoing program in 1980, the throughput capacity of the grain facility is expected to be expanded from its present 2.5 million tons to about 3½ million tons annually. Annual throughput of grains by our grain facility in recent years, with only a few exceptions, has been determined by the storage capacity of our facility. On the basis of contacts and negotiations presently underway with grain shippers now using our facility and new interests, we expect this condition to essentially continue and the expanded capacity (3½ million tons) of our facility to again be reached by 1981. With adequate funds, we feel the existing grain facility could be expanded to about a 10.5 million tons annually. Due to the water depth limitations and access and congestion problems at the present facility site. its expansion potential significantly beyond that presently being installed will be seriously limited. In view of these limitations the State's development plan has identified a site in the vicinity of the Garrows Bend-Brookley Industrial Complex for the construction of future grain facilities. These facilities are included in the State's Phase 2 intermediate term development program. However, the State has already initiated several property transactions and negotiations to facilitate these developments when the need arises.

The above programs have been planned by the State of Alabama to meet the Port of Mobile's anticipated dry bulk shipping needs and are being actively pursued by the Alabama State Docks Department. The necessity of the new facilities to be located below the tunnels is envisioned regardless of Federal channel improvements. However, full realization of maximum benefits from these facilities through use of larger vessels will not be possible without enlarged channels. Accordingly, the Alabama State Docks fully supports the plans presently being considered by the Corps of Engineers to provide a deeper channel with additional turning and anchorage areas in Mobile Harbor.

Yours very truly,

R.M. Hope

R. M. Hope

ALABAMA STATE DOCKS DEPARTMENT
MOBILE

P.O. Box 1588
MOBILE, ALABAMA

Reuben E. Wheelis
Director

November 20, 1975

Colonel Drake Wilson
District Engineer
Department of the Army
Mobile District
Corps of Engineers
P. O. Box 2288
Mobile, AL 36628

Dear Colonel Wilson:

Due to the size of vessels now calling at the Port of Mobile, we urgently request that consideration be given to increasing the width of the Mobile Ship Channel from Beacon #38 to Beacon #44 from 400 feet wide to 600 feet wide.

A case in point, we had a vessel Sunday, November 16, 1975. This vessel was 830 feet long by 128 feet beam. It was necessary to order three tugs to meet the vessel at Beacon #38 to assist the vessel in navigating this stretch of the channel.

This vessel was loaded with 70,600 long tons of iron ore destined for Birmingham steel mills.

The Bar Pilots have constantly reminded me that this is a dangerous stretch of the channel. In view of the increasing number of the larger vessels calling at the Port of Mobile and the increasing activity of ships at the McDuffie Terminals which causes further restrictions on large vessels navigating through this area, widening of the channel from Beacon #38 to Beacon #44 is necessary for safe passage of the larger vessels.

We will appreciate your giving this matter your immediate attention.

Sincerely,

REWheelis

Reuben E. Wheelis

bsg
cc: Capt. D. J. McColl
Mobile Bar Pilots Association
P. O. Box 831, Mobile, AL 36601

ALABAMA STATE DOCKS DEPARTMENT
MOBILE

Reuben E. Wheelis
Director

P.O. Box 1588
MOBILE, ALABAMA

October 6, 1975

Colonel Drake Wilson
District Engineer
Department of The Army
Mobile District, Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Drake:

The urgency for immediate construction of anchorage areas in Mobile Harbor has been pointedly brought to the attention of shipping circles as a result of two recent events:

(a) Hurricane ELOUISE which found some 22 ships in port, and

(b) The return in the past few days of a number of ships back to the Gulf for anchorage while awaiting berths at the State Docks facilities.

It is without question that had Hurricane ELOUISE continued on her predicted course, with 22 vessels in port there would have been utter chaos and enormous damage to both shipping and facilities as a result of dockside berthing.

It is academic that the cost of shipping is magnified when a vessel is required to drop anchor in the Gulf some 35 miles from the port's loading berths. For a vessel to have come into the harbor and then have been required to return to the Gulf is even worse.

I respectfully urge that, in the public interest, the matter of adequate anchorage in Mobile Harbor be severed from any other project to which it may be attached, and that special and prompt consideration be given to the processing of the anchorage proposals as a special case for immediate approval and construction.

Thank you for your continued support.

Sincerely,

R E Wheelis
Reuben E. Wheelis

ALABAMA STATE DOCKS DEPARTMENT AN AGENCY OF THE STATE OF ALABAMA
TWX 810 741-7740
P.O.BOX 1588
MOBILE,ALABAMA 36601

November 1, 1974

Colonel Drake Wilson
District Engineer
U. S. Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Colonel Wilson:

I have read with interest and concern the letter dated October 25, 1974, from the United States Environmental Protection Agency, Region IV, addressed to you, their reference 4AE:HDZ, and would like to refer specifically to the second paragraph on Page 2 of this letter.

As you are aware from previous discussions, the Department is interested in considering Area 2 as a possible location for future expansion of the Department's terminal facilities. It is our feeling that this is a most desirable area particularly for handling of large ships, such as Lash and Seabee types, and for large container ships operated by other carriers. Also, we feel that this area is desirable for future use in handling of ships with drafts exceeding 40 feet. So you see, our interest in this area is two-fold - expansion and receiving of maintenance spoil material which is suitable for use as industrial site fill material.

The Department would like to pursue a course of development in this area which is most logical. Therefore, it would be helpful to us in making this determination if the Corps could, within the framework of their authority, assist in making any studies in this area, including use of the hydraulic model at Vicksburg, which would give useful information concerning alternate schemes for development in this area.

Please have the proper people on your staff look into this matter and advise us if the Corps can assist in any way in helping us determine alternate schemes which would be least harmful to the environment, most useful, and at the same time best utilize the area for Port expansion.

Very truly yours,

W. H. Black, Jr.
Chief Engineer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

1421 PEACHTREE ST., N.E.
ATLANTA, GEORGIA 30309

RE: 4AE:HDZ

OCT 25 1974

Colonel Drake Wilson, District Engineer
U. S. Army Engineer District, Mobile
P. O. Box 2288
Mobile, Alabama 36628

Dear Colonel Wilson:

Reference is made to our letter of September 6, 1974, and our comments on the draft environmental impact statement on the Mobile Harbor maintenance dredging project and the recent field reconnaissance and meetings held with you and members of your staff on October 7, 8 and 9, 1974, to inspect available dredge spoil disposal sites.

Based on the discussions held and our field investigations of the eight sites proposed and the pressing need to establish spoil disposal areas for immediate Harbor dredging, we reluctantly concur with the use of area I-B, known as Pinto Island, including Pinto Pass; area III in its entirety; and area I-A, known as Blakeley Island, modified to include continued use of the existing spoil area south of the Alcoa Aluminum Company dikes and a portion of the area to the north of the Alcoa dikes. The designated northern area on Blakeley Island would generally include an area with dikes extending easterly from the northern Alcoa dike to the point where it intersects with the old spoil dike, extending north following the old dike line to the old east-west dike at the northern extent and then to the existing Corps dike running north and south to the northern bounds of the proposed spoil area, as shown on page 35 of the draft environmental impact statement dated July 1974. The attached map roughly delineates the areas described and is intended to only generally outline the disposal site. It is our understanding that these sites will be adequate for spoil disposal for approximately 12 years.

Alternative IV presently owned by State Docks, areas V, VI, and VII, the Jacintoport area, and area VIII, the upper Blakeley Island area, are considered to be too environmentally valuable to be utilized as spoil disposal sites now or in the future.

Area II, located southwesterly from McDuffie Island, adjacent to Brookley Air Force Base,-is considered to be an area of environmental value and unsuitable for spoiling at this time. We do recommend, however, that further studies be made on this area, including hydraulic modeling, to determine the effects of circulation in the McDuffie Island area as well as base line biological studies to quantify resource values and the effect of previous open water spoiling at this site. Use of this site for spoiling cannot be considered until such time as an adequate data base to determine the full environmental impact is developed.

You should be aware that approval of the areas indicated above for spoil deposition was agreed to as representing the least environmentally damaging alternative to the Mobile Bay ecosystem. Approval as such is based on the assumption that these areas will be used to the fullest capacity for spoil disposal, and we would encourage early attention toward engineering design which will provide for maximum dike elevation and long-term storage capacity. In accordance with the discussion at the meeting on October 9, we again strongly urge that you continue and, if necessary, expand on-going investigations and studies of other techniques for disposal of dredged spoil. With the proposed expansion of the Port facilities and the continued need for areas suitable for spoil disposal, it is imperative that methods and technology be developed concurrently with the use of the existing areas so that future problems are resolved without losses of additional environmentally valuable areas. We would welcome the opportunity to participate with you in these studies to the extent possible to completely explore the technology and methods available for final resolution of this problem.

We appreciate the facilities provided to EPA for the field reconnaissance. The approach to this problem through a coordinated effort of all of the State and Federal agencies involved is desirable and effective for resolution of problems of this nature.

Should you require any additional clarification of the areas described or any further discussion, please contact either Arthur G. Linton or Howard Zeller in the Enforcement Division.

Sincerely,

John C. White

Jack E. Ravan
Regional Administrator

Enclosure

cc: Mr. James Warr, Chief Administrative Officer
Alabama Water Improvement Commission

Mr. Ken Black, Regional Director
Fish and Wildlife Service

Mr. William H. Stevenson, Regional Director
National Marine Fisheries Service

Mr. William Black, Chief Engineer
Alabama State Docks Department

Mr. Claude D. Kelley, Commissioner
Alabama Department of Conservation and
Natural Resources

UNIVERSITY of SOUTH ALABAMA

OFFICE OF THE PRESIDENT

MOBILE, ALABAMA 36688
TEL. 205/460-6111

December 5, 1979

Col. Robert H. Ryan
District Engineer
Dept. of the Army
Mobile District
Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

RE: Navigational Improvements for Mobile Harbor, Inc.

Dear Col. Ryan:

This letter is in response to your letter of September 27, 1979, and will further reiterate and clarify those concerns expressed by the University of South Alabama regarding the recommended plan for the subject improvements, referred to as Brookley Expansion Area Gulf Disposal Plan I (Modified).

The University supports and recognizes the importance of establishing and building additional facilities for the State Docks, which expansion will benefit the community and State. However, we remain concerned that the University had no interaction with the involved agencies regarding the proposal to create fast land that would be adjacent to and extend the property of the University of South Alabama into Mobile Bay.

A major concern which has yet to be answered by the Corps of Engineers is the effect that such creation of additional land will have on the present property and utilization of such property by the University of South Alabama. As noted in my letter to you of August 31, the University provides adult educational programs and seminar activities at the Brookley Campus, as well as providing public housing at that location. The Brookley Conference Center has been and continues to be an ideal location for continuing education conferences with its setting on the Bay and with the availability of other necessary facilities compatible with the educational purposes and concepts of a continuing education conference center. Much of this environment would suffer a negative impact by the creation of the fast land which is suggested in Gulf Disposal Plan I (Modified).

It is understood that the Plan would add fast land in the amount of 1600 acres for harbor development onto the property of the University of South Alabama, thereby extending University property to the east and into the Bay. Our concern continues to be one of impact on the University and its educational activities.

As a part of the community, the University of South Alabama continues to support positive developments that will have affirmative impact for social and economic growth. The further development of the State Docks facilities and the educational complex of the University are necessarily compatible and of vital import to the citizenry of Mobile and of the State. I am certain that such harmony can be achieved through diligent efforts on the part of all entities involved in the subject plans.

As the University and its Board of Trustees continue to review these matters, I will keep you apprised. At this time I appreciate your response to my earlier letter, and your continuation of advising of any future study developments that may affect the University.

Sincerely,

Frederick P. Whiddon

FPW/krl

COASTAL AREA BOARD
POST OFFICE BOX 755
DAPHNE, ALABAMA 36526
205-626-1880

EXECUTIVE DIRECTOR
E. BRUCE TRICKEY

PLEASE ADDRESS REPLY TO: P.O. Box 755

June 9, 1980

MEMORANDUM

TO: Colonel Robert H. Ryan, District Engineer

FROM: E. Bruce Trickey, Executive Director

We have recieved Statements of Consistency from the U.S. Army Corps of Engineers regarding four alternatives for expansion of the Mobile Ship Channel. The Coastal Area Board has reviewed each of the alternatives (consistency decisions attached) and ranked each alternative based upon its acceptability related to environmental impacts and economic benefits to the area. For clarification, each of these alternatives are discussed below in this ranked order. These alternatives, ranked in order of preference, are entitled:

(1) Gulf Disposal Plan
(2) Brookley Expansion Area and Gulf Disposal Plan no. 1, Modified
(3) Brookley Expansion Area and Gulf Disposal Plan no. 2, Modified
(4) Widen Channel

Proposed Project

The first three alternatives provide for the same objective:

(a) Deepen Gulf Entrance Channel to 57 feet, Widen to 700 feet;
(b) Deepen Bay Channel to 55 feet, Widen to 550 feet;
(c) Establish a 55-foot deep anchorage area near upper limits of the channel; and
(d) Establish a 55-foot deep turning basin opposite McDuffie Island.

The fourth alternative, Widen Channel, provides for widening the existing channel to 450 feet while maintaining its existing depth.

The difference between the first three alternatives involves where the dredged materials are disposed:

(1) Gulf Disposal Plan - All new work (220,773,000 c.y.) and maintenance (5,400,000 c.y. annually) will be deposited in Gulf disposal sites.

(2) Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified - A portion of the new work material (65,300,000 c.y.) from upper bay will be deposited in area adjacent to Brookley to construct 1,047 acres of land to 17.5 feet above mean low water and 663 acres to 15 feet above mean low water. All other new work (155,473,000 c.y.) and all maintenance material (5,400,000 c.y. annually) will be deposited in approved Gulf disposal sites.

(3) Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified - Maintenance material in lower bay channel would be deposited adjacent to lower channel (2,700,000 c.y. annually) and new work material (65,400,000 c.y.) will be deposited at Brookley to create 1,047 acres of land to 17.5 feet above mean low water and 663 acres to 15 feet above mean low water. All other new work (153,473,000 c.y.) and maintenance materials (2,700,000 c.y. annually) will be deposited in approved Gulf disposal sites.

(4) Widen Channel - All new work (7,000,000 c.y.) and maintenance (4,200,000 c.y. annually) will be deposited in approved Gulf disposal sites.

Impacts

(1) Gulf Disposal Plan - With this alternative there exists the probability that circulation patterns within the bay will be altered mainly due to changes in salt wedge. While it is expected that these changes will have far reaching effects, this cannot be quantified at this time. In addition, bay bottoms will be lost as nursery and habitat areas.

This alternative will provide for the transportation of the present amount of cargo at a $28 million savings and eliminate traffic delays which could cost $16 million per year.

Impacts on the area of open water disposal in Gulf have not been quantified.

(2) Brookley Expansion Area and Gulf Disposal Plan no. 1, Modified - With this alternative there exists the probability that circulation patterns within the bay will be altered mainly due to changes in salt wedge. While it is expected that these changes will have far reaching effects, this cannot be quantified at this time. In addition, bay bottoms will be lost as nursery and habitat areas.

This alternative will have additional impacts mainly related to disposal within the Bay. By creating the land at Brookley, 2.7 square miles committed to the disposal area would result in permanent loss of estuarine habitat and recreational fisheries use of that portion of the bay. About 70 acres of wetlands would be destroyed.

Impacts on the area of open water disposal in the Gulf have not been quantified.

This alternative also provides an area for additional port expansion at the Brookley site.

(3) Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified - With this alternative, there exists the probability that circulation patterns within the bay will be altered mainly due to changes in salt wedge. While it is expected that these changes will have far reaching effects, this cannot be quantified at this time. In addition, bay bottoms will be lost as nursery and habitat areas.

This alternative will have additional impacts mainly related to disposal within the Bay. By creating the land at Brookley, 2.7 square miles committed to the disposal area would result in permanent loss of estuarine habitat and recreational fisheries use of that portion of the bay. About 70 acres of wetlands would be destroyed.

This alternative would have the additional impacts associated with the deposition of 2.7 million cubic yards of maintenance material adjacent to the lower portion of the bay. The most significant concern involves the physical fate of the material. The Corps has determined that this material does not cause ridges along the lower portion of the channel, but is scattered over a large area due to wind, wave, and tidal action. While this may be a valid assumption, no in depth studies have been carried out to support this assumption.

This alternative also provides an area for additional port expansion at the Brookley site.

Impacts on the area of open water disposal in the Gulf have not been quantified.

(4) Channel Widening - With this alternative there exists the probability that circulation patterns within the bay will be altered mainly due to changes in salt wedge. While it is expected that these changes will have far reaching effects, this cannot be quantified at this time. In addition, bay bottoms will be lost as nursery and habitat areas. These impacts would probably not be as significant since the channel would not be deepened and would be widened to only 450 feet instead of 500 feet.

Impacts on the area of open water disposal in the Gulf have not been quantified.

This alternative would not provide for deeper draft vessels, although it would help to reduce current traffic delays.

Summary of Impacts

In the opinion of the staff, each of the four alternatives present potential degradation of coastal resources through the following impacts:

a. The two Brookley spoil disposal alternatives will result in the permanent loss of 2.7 square miles of bay bottoms.

b. The two Brookley spoil disposal alternatives will result in the loss of 70 acres of viable wetlands.

c. Brookley Plan no. 2 will result in the open water disposal of 2.7 million cubic yards of spoil material annually in the lower part of the bay.

d. Open water Gulf disposal will have impacts. These impacts have not been tested.

e. Each of the four proposed alternatives are expected to alter circulation patterns in the bay. The impacts of these changes in the circulation patterns are assumed by the Corps to be not significant. However, these must still be tested in the bay in order to be proven correct.

Staff Recommendation

Because of the potentially serious impacts of the four alternatives summarized above, it is recommended that the four alternatives be certified consistent with the management program with the conditions listed in the following section.

General Conditions

Because of the expected adverse impacts caused by the proposed project, the applicant will prepare a plan(s) to be approved by the Coastal Area Board to address the impacts of the chosen alternative.

Two important general criteria must be met by the plan(s). First, the plan must protect present levels of biological resources to the maximum extent practicable. Second, the measures taken to protect the biological resources or to mitigate adverse project impacts must be economically reasonable.

Because the loss of 1200 acres of bay bottoms in the two Brookley alternatives is considered to be of great consequence to the Coastal Area Board, we strongly urge the Corps to evaluate the use of the present Brookley Complex for future docks expansion before selecting either Alternatives 2 or 3 (Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified or Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified) which involves the loss of 1200 acres of bay bottoms.

Specific Conditions

(1) Alternative Plan #1 - Gulf Disposal Plan

a. The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize the impacts, and 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are unfounded and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts.

(2) Alternative Plan #2 - Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified.

a. The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize these impacts, 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are false and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts, 3) to minimize and/or mitigate the impacts resulting from the loss of bay bottoms as disposal areas for spoil disposal at the Brookley site, 4) to minimize and/or mitigate the loss of wetlands due to disposal of dredged materials at the Brookley site, e.g., identify alternative disposal sites, create additional wetlands, etc.

(3) Alternative Plan #3 - Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified

a. The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize the impacts, 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are false and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts, 3) to minimize and/or mitigate the impacts resulting from the loss of bay bottoms as disposal areas for spoil disposal at the Brookley site, identify mitigation alternatives etc., 4) to minimize and/or mitigate the loss of wetlands due to disposal of dredged materials at the Brookley site, e.g., identify alternative disposal sites, create additional wetlands, etc., and 5) to assess the biological impacts of open water disposal of dredged material in the bay and select disposal methods and sites which will minimize these impacts.

(4) **Alternative Plan #4 - Widen Channel**

a. The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize the impacts, and 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are false, and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts.

COASTAL AREA BOARD
CERTIFICATION OF CONSISTENCY APPROVAL ACTION FOR A FEDERAL PROJECT OR ACTIVITY

TO: Colonel Robert H. Ryan, Mobile District Corps of Engineers
SAMPD-EC

FROM: Alabama Coastal Area Board
P. O. Box 755
Daphne, Alabama 36526
(205) 626-1880

CAB Reference # COEP-80-05

1. Application Number (assigned by federal agency) ____________ Date of Receipt of Application January 24, 1980

2. Name and Address of Applicant

Name Colonel Robert H. Ryan, Mobile District C. of E.
Street or Box P. O. Box 2288
City, State, Zip Mobile, AL 36628
Home Phone ____________ Business Phone ____________

3. Category of Project or Activity (e.g. road construction):

Mobile Ship Channel Expansion - Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified Alternative #2

4. ☒ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be consistent with the Coastal Area Management Program. This approval is conditional upon continued compliance with the management program and the following conditions:

General Conditions

Because of the expected adverse impacts caused by the proposed project, the applicant will prepare a plan(s) to be approved by the Coastal Area Board to address the impacts of the chosen alternative.

Two important general criteria must be met by the plan(s). First, the plan must protect present levels of biological resources to the maximum extent practicable. Second, the measures taken to protect the biological resources or to mitigate adverse project impacts must be economically reasonable.

Because the loss of 1200 acres of bay bottoms in each of the two Brookley alternatives is considered to be of great consequence to the Coastal Area Board, we strongly urge the Corps to evaluate the use of the present Brookley Complex for future docks expansion before selecting either Alternative 2 or 3 (Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified or Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified) which involves the loss of 1200 acres of bay bottoms.

READEX FICHE best copy available

Specific Conditions

The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize these impacts, 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are false and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts, 3) to minimize and/or mitigate the impacts resulting from the loss of bay bottoms as disposal areas for spoil disposal at the Brookley site, 4) to minimize and/or mitigate the loss of wetlands due to disposal of dredged materials at the Brookley site, e.g., identify alternative disposal sites, create additional wetlands, etc.

☐ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be inconsistent with the Coastal Area Management Program. The reasons and supporting details for the objection and alternative means suggested by the CAB to conduct the use in compliance with the management program are attached. A copy of this notice of objection will be sent to the Assistant Administrator for Coastal Zone Management, NOAA.

Date 6/11/90 E. Bruce Trickey

E. Bruce Trickey, Executive Director

COASTAL AREA BOARD
CERTIFICATION OF CONSISTENCY APPROVAL ACTION FOR A FEDERAL PROJECT OR ACTIVITY

TO: Colonel Robert H. Ryan, Mobile District Corps of Engineers
SAMPD-EC

FROM: Alabama Coastal Area Board
P. O. Box 755
Daphne, AL 36526
(205) 626-1880

CAB Reference # COMP-80-05

1. Application Number (assigned by federal agency) ____________ Date of Receipt of Application January 24, 1980

2. Name and Address of Applicant

Name Colonel Robert H. Ryan, Mobile District C. of E.
Street or Box P. O. Box 2288
City, State, Zip Mobile, AL 36628
Business Phone ____________ Home Phone ____________

3. Category of Project or Activity (e.g. road consturction):

Mobile Ship Channel Expansion - Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified Alternative #3

4. ☒ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be consistent with the Coastal Area Management Program. This approval is conditional upon continued compliance with the management program and the following conditions:

General Conditions

Because of the expected adverse impacts caused by the proposed project, the applicant will prepare a plan(s) to be approved by the Coastal Area Board to address the impacts of the chosen alternative.

Two important general criteria must be met by the plan(s). First, the plan must protect present levels of biological resources to the maximum extent practicable. Second, the measures taken to protect the biological resources or to mitigate adverse project impacts must be economically reasonable.

Because the loss of 1200 acres of bay bottoms in the two Brookley alternatives is considered to be of great consequence to the Coastal Area Board, we strongly urge the Corps to evaluate the use of the present Brookley Complex for future docks expansion before selecting either Alternative 2 or 3 (Brookley Expansion Area and Gulf Disposal Plan No. 1, Modified or Brookley Expansion Area and Gulf Disposal Plan No. 2, Modified) which involves the loss of 1200 acres of bay bottoms.

Specific Conditions

The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize the impacts, 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are false and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts, 3) to minimize and/or mitigate the impacts resulting from the loss of bay bottoms as disposal areas for spoil disposal at the Brookley site, identify mitigation alternatives, etc. 4) to minimize and/or mitigate the loss of wetlands due to disposal of dredged materials at the Brookley site, e.g., identify alternative disposal sites, create additional wetlands, etc., and 5) to assess the biological impacts of open water disposal of dredged material in the bay and select disposal methods and sites which will minimize these impacts.

☐ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be inconsistent with the Coastal Area Management Program. The reasons and supporting details for the objection and alternative means suggested by the CAB to conduct the use in compliance with the management program are attached. A copy of this notice of objection will be sent to the Assistant Administrator for Coastal Zone Management, NOAA.

Date 6/16/80 E. Bruce Trickey

E. Bruce Trickey, Executive Director

COASTAL AREA BOARD
CERTIFICATION OF CONSISTENCY APPROVAL ACTION FOR A FEDERAL PROJECT OR ACTIVITY

TO: Colonel Robert H. Ryan, Mobile District, Corps of Engineers
SAMPD-EC

CAB Reference # COEP-80-05

FROM: Alabama Coastal Area Board
P. O. Box 755
Daphne, Alabama 36526
(205) 626-1880

1. Application Number (assigned by federal agency) ______ Date of Receipt of Application January 24, 1980

2. Name and Address of Applicant

Name Colonel Robert H. Ryan, Mobile District C.of E.
Street or Box P. O. Box 2288
City, State, Zip Mobile, AL 36628
Home Phone ______ Business Phone ______

3. Category of Project or Activity (e.g. road construction):

Mobile Ship Channel Expansion - Gulf Disposal Plan
Alternative #1

4. ☒ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be consistent with the Coastal Area Management Program. This approval is conditional upon continued compliance with the management program and the following conditions:

General Conditions

Because of the expected adverse impacts caused by the proposed project, the applicant will prepare a plan(s) to be approved by the Coastal Area Board to address the impacts of the chosen alternative.

Two important general criteria must be met by the plan(s). First, the plan must protect present levels of biological resources to the maximum extent practicable. Second, the measures taken to protect the biological resources or to mitigate adverse project impacts must be economically reasonable.

Specific Conditions

The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize the impacts, and 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are unfounded and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts.

☐ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be inconsistent with the Coastal Area Management Program. The reasons and supporting details for the objection and alternative means suggested by the CAB to conduct the use in compliance with the management program are attached. A copy of this notice of objection will be sent to the Assistant Administrator for Coastal Zone Management, NOAA.

Date 6/10/80 E. Bruce Trickey
E. Bruce Trickey, Executive Director

COASTAL AREA BOARD
CERTIFICATION OF CONSISTENCY APPROVAL ACTION
FOR A FEDERAL PROJECT OR ACTIVITY

TO: Colonel Robert H. Ryan, Mobile District Corps of Engineers
SAMPD-EC

FROM: Alabama Coastal Area Board
P. O. Box 755
Daphne, Alabama 36256
(205) 626-1880

CAB Reference # COEP-80-05

1. Application Number (assigned by federal agency) ____________ Date of Receipt of Application January 24, 1980

2. Name and Address of Applicant

Name Colonel Robert H. Ryan, Mobile District C. of E.
Street or Box P. O. Box 2288
City, State, Zip Mobile, AL 36628
Home Phone ____________ Business Phone ____________

3. Category of Project or Activity (e.g. road construction):

Mobile Ship Channel Expansion - Widen Channel
Alternative #4

4. ☒ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be consistent with the Coastal Area Management Program. This approval is conditional upon continued compliance with the management program and the following conditions:

General Conditions

Because of the expected adverse impacts caused by the proposed project, the applicant will prepare a plan(s) to be approved by the Coastal Area Board to address the impacts of the chosen alternative.

Two important general criteria must be met by the plan(s). First, the plan must protect present levels of biological resources to the maximum extent practicable. Second, the measures taken to protect the biological resources or to mitigate adverse project impacts must be economically reasonable.

Specific Conditions

The applicant will prepare a plan during post-authorization studies: 1) to assess the biological impacts of open gulf disposal and select disposal methods and sites which will minimize the impacts, and 2) to minimize the impact of the project on the biology of the Coastal Area. If the Corps assumptions concerning circulation patterns are false, and the biology is seriously impacted, the applicant will prepare a plan to carry out actions to mitigate these impacts.

☐ The Coastal Area Board has reviewed this federal project or activity and Certification of Consistency and has found it to be inconsistent with the Coastal Area Management Program. The reasons and supporting details for the objection and alternative means suggested by the CAB to conduct the use in compliance with the management program are attached. A copy of this notice of objection will be sent to the Assistant Administrator for Coastal Zone Management, NOAA.

Date 6/10/80 E. Bruce Trackey

E. Bruce Trackey, Executive Director

ALABAMA STATE DOCKS DEPARTMENT
MOBILE

Robert M. Hope
Director

P. O. Box [illegible]
MOBILE, AL [illegible]

November 3, 1980

Col. Robert H. Ryan
District Engineer
U. S. Army Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Sir:

The Department has received and reviewed the proposed agreement between the United States of America and the Alabama State Docks Department for local cooperation at Mobile Harbor which was enclosed with your letter of October 16, 1980.

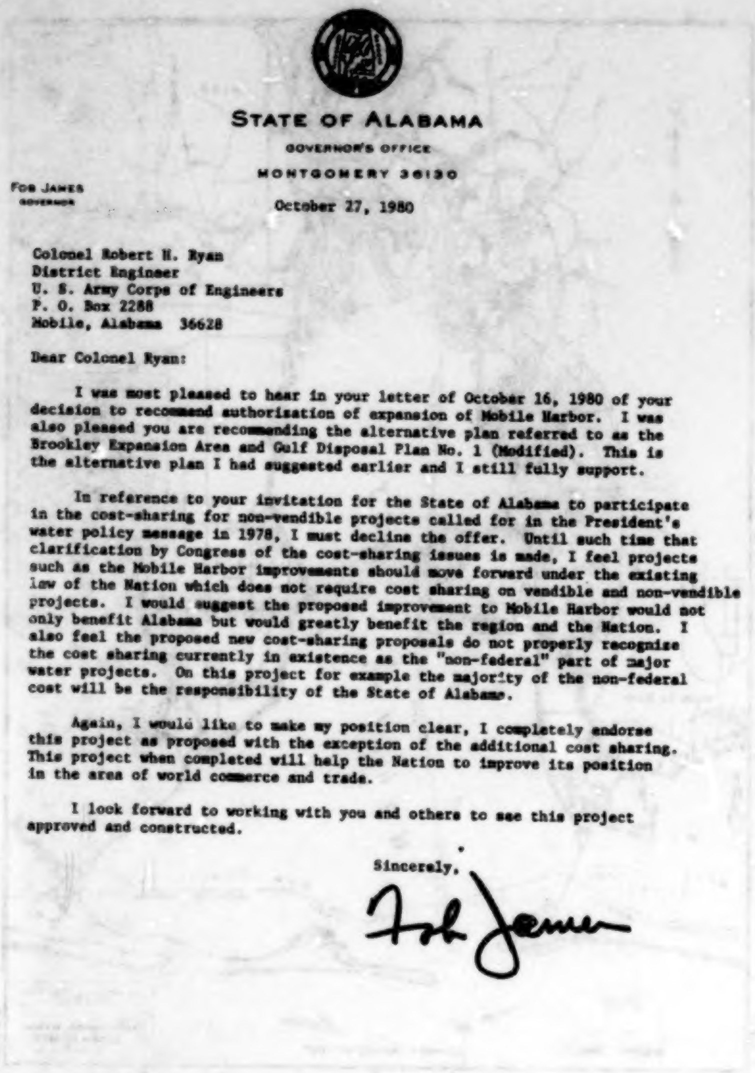
On Page 2 of the draft of the agreement, the Department objects to Paragraph (i) of Section 1, which would require the Department to retain fee ownership of all lands created, etc. The Department hereby requests that this requirement be deleted in that the creation of this land from fill is not required to accommodate traffic to support the benefits of the project. Further, if the Department is to be required to make contributions for special local benefits deriving from land enhancement due to land fill, the Department should be able to utilize the land as it sees fit without restriction as proposed in Paragraph (i) of Section 1.

The Department is not agreeable to Section 2 on Page 2 of the draft agreement and concurs with the Governor's statement as made in his letter dated October 27, 1980, addressed to you. The Department finds the remainder of the draft acceptable, and we are looking forward to working with you on the implementation of this project.

Yours very truly,

R. M. Hope

R. M. Hope



STATE OF ALABAMA
GOVERNOR'S OFFICE
MONTGOMERY 36130

FOB JAMES
GOVERNOR

October 27, 1980

Colonel Robert H. Ryan
District Engineer
U. S. Army Corps of Engineers
P. O. Box 2288
Mobile, Alabama 36628

Dear Colonel Ryan:

I was most pleased to hear in your letter of October 16, 1980 of your decision to recommend authorization of expansion of Mobile Harbor. I was also pleased you are recommending the alternative plan referred to as the Brookley Expansion Area and Gulf Disposal Plan No. 1 (Modified). This is the alternative plan I had suggested earlier and I still fully support.

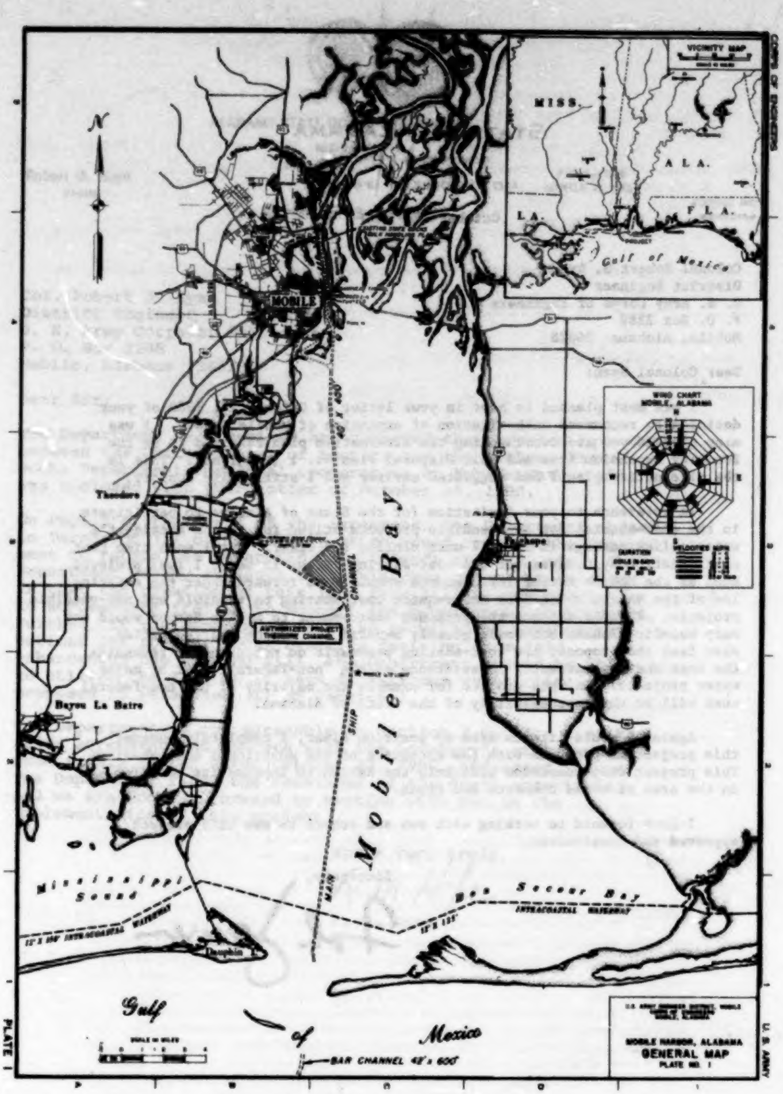
In reference to your invitation for the State of Alabama to participate in the cost-sharing for non-vendible projects called for in the President's water policy message in 1978, I must decline the offer. Until such time that clarification by Congress of the cost-sharing issues is made, I feel projects such as the Mobile Harbor improvements should move forward under the existing law of the Nation which does not require cost sharing on vendible and non-vendible projects. I would suggest the proposed improvement to Mobile Harbor would not only benefit Alabama but would greatly benefit the region and the Nation. I also feel the proposed new cost-sharing proposals do not properly recognize the cost sharing currently in existence as the "non-federal" part of major water projects. On this project for example the majority of the non-federal cost will be the responsibility of the State of Alabama.

Again, I would like to make my position clear, I completely endorse this project as proposed with the exception of the additional cost sharing. This project when completed will help the Nation to improve its position in the area of world commerce and trade.

I look forward to working with you and others to see this project approved and constructed.

Sincerely,

Fob James


CORPS OF ENGINEERS
U.S. ARMY
PLATE 1
N
VICINITY MAP
MISS.
ALA.
LA.
FLA.
Gulf of Mexico
MOBILE
WIND CHART MOBILE, ALABAMA
Theodore
Fairhope
Bayou La Batre
AUTHORIZED PROJECT THEODORE CHANNEL
MAIN SHIP CHANNEL 40' x 400'
Mobile Bay
Mississippi Sound
Bon Secour Bay
INTRACOASTAL WATERWAY
12' x 150' INTRACOASTAL WATERWAY
Dauphin
Gulf of Mexico
BAR CHANNEL 42' x 600'
SCALE IN MILES
MOBILE HARBOR, ALABAMA
GENERAL MAP
PLATE NO. 1